Personal Computer World

CENTURY

MICRO WARS

ON THE COMMODORE 64

Humphrey Walwyn

MICROWARS ON THE COMMODORE 64 Humphrey Walwyn

About the Author:

Humphrey Walwyn is a writer and broadcaster of many years standing. Based in London, he has been involved with computers and computing for a long time. Indeed, he was one of the very first owners of home-micros in the United Kingdom.

Although he has written before for computer magazines and books, this is his first book for Century.

Note on the printing of the listings

The listings in this book have been printed using a Commodore 1526 printer.

Available in Century's Science & Technology series

Dictionary of New Information Technology
A. J. Meadows, M. Gordon and A. Singleton
What to Buy for Business: A Handbook of
New Office Technology
John Derrick and Phillip Oppenheim
The Electronic Mail Handbook
Stephen Connell and Ian A. Galbraith
The Way the New Technology Works
Ken Marsh
Mind
David A. Taylor

In association with 'Personal Computer World'

Microcomputing for Business:
A User's Guide
edited by Dick Olney
The Microcomputer Handbook:
A Buyer's Guide
edited by Dick Olney
The Spectrum Handbook
Tim Langdell
Programs for the Dragon 32
Tim Langdell
The Intimate Machine
Neil Frude
Educational Programs for the BBC Micro
Ian Murray
Educational Programs for the Dragon
Ian Murray
Educational Programs for the Spectrum
Ian Murray
Century Computer Programming Course
Peter Morse and Ian Adamson
Computer Gamesmanship
David Levy
The Information Technology Yearbook 1983/4
Dr Philip J. Hills with Roger Martlew
The Database Primer
Rose Deakin

Microwars on the Commodore 64

HUMPHREY WALWYN

CENTURY COMMUNICATIONS
LONDON

Copyright © Humphrey Walwyn

All rights reserved

First published in Great Britain in 1983 by
Century Communications Limited
(a subsidiary of Century Publishing Co. Ltd),
76 Old Compton Street, London W1V 5PA

ISBN 0 7126 0229 1

Printed in Great Britain by
Billing & Sons Limited
Hylton Road
Worcester

Contents

Introduction 7
Summary of Games 13

Waterloo 17
Caractacus 74
Torpedo Bomber 93
Richtoven 109
Dreadnought 134
Strategix 192

Appendix 243

Copyright © Hutchinson Wor[illegible]

All rights reserved

First published in Great Britain in 1983 by
Century Communications Limited
a subsidiary of Century Publishing Co. Ltd
76 Old Compton Street, London W1V 5PA

ISBN 0 7126 0226 1

Printed in Great Britain by
Billing & Sons Limited
Hylton Road
Worcester

Introduction

Any attempt to create a totally accurate simulation of real life on a game board or computer is bound to be a compromise. Horserace games don't feature lifesize horses galloping over the sitting room carpet – think of the mess and the clearing up after the event! Business games are not normally played with real money in the home, otherwise 'landing on Mayfair' might well involve more than the mortgaging of little plastic houses. War-gaming suffers the same dilemma.

For a start, it might be argued that 'War-gaming' is something of a misnomer. War is not fun, so why play games about it? The answer is that not all war-games are fun either. I have often played serious games into the small hours, and the arguments that can ensue over the intricacies of tactics and strategy are definitely not amusing! Besides which, losing at anything doesn't come easy to me, whether it is a board game using cardboard counters to represent Napoleon's armies or a computerised game of 'battleships'. The word 'gaming' in this case means only 'an attempt to recreate a contest'.

The level of attempted realism is a problem for all games designers. In this book you will find computer games that vary considerably in attempted realism. But no matter how complex or real you try to make a game, it is still just a game. And a game needs to be playable. Many war-games on boards played with counters try to make the game so 'true to life' that the rules become unplayably complex. If it takes four hours to set up the board and place the armies on it, and a further four hours to read the rules, then there's not much time left to play the game! That is where the computer can help since it increases the playability of the game. And you can do things on a machine that you cannot do on a board.

Board war-games have one major drawback. I can see exactly where the enemy is, and my opponent can see exactly where all my forces are: they're laid out on the table in open view. Real warfare just doesn't work like that. But a computer can be programmed to release information to the players only as the game progresses.

Another problem is how to make your moves. Most board games require players to make their movements in turns. This is plainly unrealistic. 'Gosh, I see the enemy's tanks have taken the bridge, but we had better wait while they finish their go!' Generals don't fight battles by turns, waiting until you can see what the other side has just done. Orders are issued by both armies at the same time. Some games make provisions for simultaneous movement, but this slows up the game process since it calls for players to write down all their orders and then make a sort of 'joint judgement' with rule books in hand. The computer can speed this process up considerably and act as a judge and impartial umpire at the same time.

There's no arguing with a machine!

All the games in this book are designed to be played on *one* computer, and so most of the two-player games call for independent entry of moves by each player in turn while the other player either leaves the room or looks the other way. In each case the moves typed in by the players are calculated simultaneously by the machine to make sure that all the events happen at the same time.

Even if you have never played a war-game before, you should have no trouble in understanding the basic principles. If you're an expert, then you might have an advantage over newcomers. One thing I have noticed when playing with friends is that the 'real' experts – military or naval officers – very often do rather badly when playing against amateur militarists. Perhaps they consistently underestimate the opposition or find theoretical military science unrealistic compared to practical experience. In any event, whether you win or lose, I hope you gain a little from the experience of playing the games!

Important

All the games in this book are designed to run on the Commodore 64 computer. To modify them for other machines is certainly possible if you bear in mind that the screen width of the 64 is 40 columns.

The programs contain colour codes, and most use sound as well. The 64's colour commands and addresses for sounds on screen 'POKEs' are given in the subroutine at line 63900. Each program contains this subroutine and you may like to copy lines 63900–63930 as a useful separate sub-program.

Please note that my printer does not have a 'reversed pound' sign on it. This means that the 'reversed back-slash' sign as given to the variable U2$ in line 63905 should be a reversed pound sign (colour code for 'red'). Only one program – Dreadnought – uses three voice settings for the 64's sound commands. Any other program with sound uses only the first voice. I list below the meanings and values of the 64's sound and colour codes, all of which begin with the letter U. This is to save confusion: when programming try to avoid using any variable starting with the letter U.

Subroutine at lines 63900–63930

Addresses for colour

US = Screen character position
UG = Screen background colour
UC = Screen colour position
UB = Screen border colour
UK = The difference between character and colour screen addresses (54272)

This latter is only used in one or two programs.

Addresses for sound

UV = Volume (0–15) for voice one
UD = Sustain for voice one
UH = High byte for note
UA = Attack for voice one
UW = Waveform (17, 33, 65 or 129)
UL = Low byte for note

These are all for voice one. For voice two, add seven to the address, and for voice three add fourteen.

Colour values

Colour values are expressed in two forms: string and numeric variables. Each of the fourteen colour values may therefore either be expressed as a numeric variable in a 'POKE' command or as an expression within a 'PRINT' command. Regular 64 users will note that many of the computer's colours are remarkably similar to each other, so I tend to use only the fourteen mentioned here:

U0 = Black U1 = White U2 = Red U3 = Green
U4 = Blue U5 = Orange U6 = Brown U7 = Light Red
U8 = Light Green U9 = Light Blue UU = Purple
UR = Mid-light Grey UE = Yellow UF = Dark Grey

Variables UM, UN, UP and UQ are used within loops and subroutines.

Apart from specialised 64 codings, the rest of the program listings are self explanatory. Each game has a full breakdown, some initial notes of introduction, a program variable list and full program listing. I have also included samples of play, using a black and white line printer. The graphics look considerably better in colour on a 64.

Above all, I would urge you to change values, insert extra lines and generally alter the programs where you feel you can do better. If any programmer these days reckons he has found the perfect program for a particular simulation, then he's kidding himself. My programs all work perfectly well, but I'm sure that you can add to the sound, colour, graphics or logic. I am happy to be the catalyst for some hours of enjoyment.

Some of the games are quite long and need most of the 64's memory. If you start to run out of available space, then delete game instruction lines and REM lines where necessary. Others will only occupy about 8K RAM, so there should be no problem with them.

I have fun with these games, so I hope you do too.

Adapting the games for Commodore PET computers

I have written all these programs to work on the PET too. The colour codings and shade tints have been designed to function in black and white as well as in colour. If you own a PET, then you can easily run these programs if you make the following adjustments:

1 Ignore all variables that begin with the letter U except 'US' (see below). This applies equally to string characters (e.g. U3$) and numeric variables (e.g. U3). Be careful when you omit the lines that contain 'POKE', 'PEEK' or 'PRINT' statements within the line or expression that need to be kept.

2 Delete all subroutines beyond lines 60000. I have reserved this area for a number of functions that contain 'POKE' and 'PEEK' commands for the 64. In particular delete lines 63900–63930 since these are the basic 64 colour and sound settings. Be warned that there are occasional subroutines outside the 60000+ area that are also 64 specialist areas. If in doubt, check whether the sole function of the subroutine is concerned with 'U' variables. If it is, then ignore the subroutine.

3 The screen 'POKE' position address for the PET starts at 32768. The equivalent address for the 64 starts at 1024. It is important at the start of every program that you align the correct setting. Somewhere near the top of each program (mostly within the first 20 lines) you will see this statement: GOSUB63900. This is obviously not required – as I've just explained – on the PET. To clear all screen codes for the PET delete this statement and substitute 'US=32768' in exactly the same position in the line. It's really quite simple: delete 'GOSUB63900' and substitute 'US=32768'.

The printer used in the LINE PRINTs is a Commodore printer, so all specialised codes will be known to you! Just make sure that every program is preceded by the correct 'POKE 59468' byte. All these programs function in upper case/graphics mode. Some PETs – the early ROM 2000 series – are normally based in this mode. More recent PETs will need a separate command to take them out of lower case mode and into upper case mode.

If you follow these three suggestions, then all the programs will work on *any* type of 40-column PET – new ROM, old ROM, upgraded ROM. There are not many alterations to make, because I wrote the original games on an old ROM type 2001 PET. I have subsequently deleted all awkward machine code routines, so there are no nasty bits of assembly loadings to transfer. It is all in BASIC . . . good old BASIC.

Summary of Games

WATERLOO (32K–38K RAM required)
A two player game which simulates the most famous Napoleonic engagement of them all. Wellington and Blücher pit their wits against Napoleon as the screen becomes a map of southern Belgium. Each side has ten units showing the divisional commanders present and all the troop strengths – artillery, infantry and cavalry – are accurately depicted. The game even includes an 'instant replay' after the battle is over so both sides can sit back and see what moves the opposing player made.

CARACTACUS (8K RAM required)
A simple but attractive game of ancient warfare. The screen becomes a battlefield of opposing armies as they become inter-mingled with each other. All the forces involved will unhesitatingly obey your commands – although some may move faster than others which will lead to great confusion. Individual soldiers lose and gain morale factors as the tide of battle ebbs and flows. If the picture becomes too muddled after an hour's fighting, both sides can reorganise their armies and carry on with the battle as before.

TORPEDO BOMBER (8–16K RAM required)
A solo game which moves in 'real time' as you attempt to manoeuvre your aircraft into a good torpedo bombing run against enemy shipping. Speed, course, bearing and torpedo time to target are included as the screen shows your target

with its changing perspective. The greater the range, the harder the target as the ship turns to avoid your torpedo. Watch out for enemy gunfire!

RICHTOVEN (8K RAM required)
A two-player game of First World War air combat. The main difference between this and other air warfare games is that here the game is virtually in two parts. Firstly, both players must design and build their aircraft. What do you want? A biplane? A triplane? How much ammunition for your forward-firing gun? What weight of airframe and what power of engine? Having built it, and providing it is capable of flying at all (!), then both players can fight each other over the skies of northern France. Taking off and flying even without any combat is difficult enough!

DREADNOUGHT (32K–38K RAM required)
Opposing fleets join battle in this two-player game. Having chosen your vessels and placed them in line ahead columns, the screen shows the relative placement and direction of movement of each ship. The navies are based on early 20th-century designs and pose the same sort of problems facing opposing fleets in the First World War. Will an 'old' battleship with a couple of light cruisers be able to outgun a couple of 'new' battle cruisers? Range, bearing, speed, damage reports, communications, main and secondary armaments, armour penetration, battle turns and column manoeuvres are all included, and a pictorial view of each ship, with accumulated damage, is seen on the screen.

STRATEGIX: NAPOLEONIC EUROPE, AMERICAN CIVIL WAR (16K RAM required)
A unique series of strategic war-games which use the same common game routines. Opposing fleets and armies march over the full game map displayed on the screen. Defensive positions, cities, morale, strength and convoying possibilities are all included as rival forces liberate and recapture enemy

territory. This is a game of positional conquest and strategic opportunity as both players attempt to outguess their opponent's moves. Full data is included for all the versions of this game – map, cities, units and strengths – to enable you to play any or all of them or even to invent your own.

artillery. This is a game of positional manoeuvre and strategic importance and both players attempt to outguess their opponent's moves. Full data is included for all the versions of this game – map, cities, units and strengths – to enable you to play any or all of them or even to invent your own.

RICHTOFEN (8K RAM required)

A two-player game of First World War air combat. The main difference between this and other air warfare games is that here the game is virtually in two parts. Firstly, both players must design and build their aircraft. What do you want? A [illegible]? A biplane? How much ammunition for your forward-firing gun? What weight of airframe and what power of engine? Having built it, and providing it is capable of flying at all (!), then both players can fight each other over the skies of northern France. Taking off and flying even without any enemy is difficult enough!

DREADNOUGHT (16K – 32K RAM required)

Dreadnought [illegible] 1916 is a two player game. Having chosen your vessels and placed them in line ahead columns the screen shows the relative placement and direction of movement of each ship. The navies are based on early 20th century designs and pose the same sort of problems facing admirals then in the First World War. Will an 'old' battleship with a couple of light cruisers be able to outgun a couple of 'new' battle cruisers? Range, bearing, speed, damage reports, communications, main and secondary armament, armour penetration, battle turns and column manoeuvres, are all included, and a pictorial view of each ship, with accumulated damage, is seen on the screen.

STRATEGIC: NAPOLEONIC EUROPE, AMERICAN CIVIL WAR (16K RAM required)

A various series of strategic war-games which use the same common game routines. Opposing fleets and armies march over the full game map displayed on the screen. Defensive positions, cities, morale, strength and [illegible] are all included as rival forces manoeuvre and [illegible]

Waterloo

A game for two players

The French are led by Napoleon and the Allies by Wellington and Blücher. Each side has ten units each containing various numbers of artillery, infantry and cavalry forces. Some of them are full corps size, while others (like the leaders and one or two more) have only cavalry. Units consisting only of cavalry may move twice as far in each game turn and are useful for finding out about the position of the enemy. The object is simple enough: to beat the other side.

Each move consists of one simultaneous input by each player in turn. This move represents one hour in 'game' time. During the battle, points will be subtracted from each side as time is lost and casualties mount up. At any stage of the game, or more properly when you've both had enough, then the game can be replayed before the eyes of both players who can see their opponent's moves in retrospect. Although this shows all your mistakes to the other side, you may also find out something useful about your opponent's strategy for the next game.

How to play

On 'RUNning' the program, the first thing to do is to type in your code words without the other player seeing! Choose any word of five letters and, whatever you do, don't forget it!

The screen will then display 'WELLINGTON'S CODE WORD', and the allied player types the allied code word in. A full display of all your units will then be put on the screen together with their current values and morale. Obviously, for all this portion of the game, the 'Napoleon' must not look at the screen. The player can go and read up Clausewitz's study of war or something! When you next press any key, the main map will be displayed, and your units will appear upon it one by one. As each of your units is displayed, so any enemy units that are within sighting range of your forces (none at the start of the game) will also be shown on a reverse field. In this way only a part of the actual battle is revealed to either player. Once all units have 'reported in', you will be asked for orders.

Units containing infantry or artillery will be able to move only one square per hour (i.e. per move). Only two letters/numbers are required, and you should not press the 'RETURN' key. Infantry and artillery pieces may therefore only receive movement orders such as W1, E1, N1, S1, or orders not to move at all. Cavalry units may move with N2, W2, E2, S2, NE, NW, SE, SW. Each time you move, the last orders received are printed in reverse field just below the time and date. When all your orders have been given, the screen will clear and display 'CHECKING YOUR ORDERS'.

Any number of things may happen to your orders. If they are illegal, they will be disobeyed. Some orders will be randomly lost, and the unit may then move anywhere of its own accord. Other units may be stuck in the forests and not be able to get out this move!

Once all your moves have been checked, the screen will clear again, and the French will have their own moves and display sequence – exactly as above, but from the French point of view of course. When the input request for 'NAPOLEON'S CODE WORD?' arrives on the screen, the Allied player should go and do something else for a minute or two. When both players have input their moves the screen will clear and the command 'MOVES AND COMBAT' will be displayed. Both players now look at the screen and wait.

Combat

If two or more units of opposing sides are either on the same square or within one square of each other, then battle will automatically be joined. Furthermore, any friendly units that are within one square of the engaged forces will automatically join in the action too, so large battles can suddenly happen without either side planning any combat at all! If the battle points of either side get too low, the units may withdraw of their own accord and thus, as they retreat, affect the morale and placing of other friendly units not yet engaged.

There are two types of combat. Small scale combat, when not enough opposing forces are engaged, will lead to a number of phases. These are 'artillery combat', when only those units with artillery will inflict losses on the other side, and 'general skirmishing' when relatively small losses will be inflicted by opposing cavalry and infantry. This small scale combat can also happen when, although there are plenty of forces ranged against each other, the point of engagement is too far for all the forces to march to it – in other words, both armies are disorganised and unable to have a real go at each other.

However, if there are enough forces engaged at the scene of action, then the computer will automatically progress to the 'battle map'.

Battle map

The opposing contacts will be displayed on a separate grid map. Watch out for the possible change in direction, so before you move look at the compass display at the centre top of the screen. Fighting will now take place whenever opposing forces are present in the same small square. This is displayed by a flashing zigzag line and the opposing points values on reverse field. When asked for moves, each side may move only one unit from one square to another. The moves are now ten minutes long – rather than one whole hour – and the losses inflicted on each unit are rather more serious. This phase enables each side to reinforce beleaguered units or pull them back from awkward situations. To move, press the unit's letter followed by E, N, S or W. After one hour play returns to 'MOVES AND COMBAT' until all opposing forces have engaged each other. The whole process may take some time.

Other points

The map (main map) is an accurate reconstruction of the Waterloo strategic area and contains several landmarks which will be well known to students of the battle. The crossroads of Quatre Bras is in the centre with the 'Belle Alliance' (the actual site of Waterloo itself) near the top of the map. The French, to begin with, are situated about to attack the village of Ligny where the majority of the Prussian forces are gathered. The town squares are marked by the 'closed dot' PET graphics symbols and are an advantage to defending infantry. The tree/forest squares are marked by green 'clubs' and do not affect combat, but do affect movement on a random basis.

WATERLOO . . . some historical notes . . .

The Waterloo campaign lasted three days from June 16th to June 18th. At the start of the game, the opposing forces are set up in their historical positions at lunchtime on June 16th. The screen shows how Napoleon attempted to deal with two hostile armies. In order to prevent the Prussians and the Anglo-Dutch army joining up, he was forced to divide his own army. He left the left wing under the command of Marshal Ney with orders to take and hold the vitally important crossroads of Quatre Bras while the remainder of the French army would attack the Prussians grouped around the village of Ligny.

Both battles were joined in the afternoon of June 16th. The French army dealt the Prussians a severe blow at the battle of Ligny. More than 16,000 Prussians were killed or wounded and Zieten's corps together with Pirch and Thielmann suffered heavy casualties. The Prussian defeat would have been markedly worse had it not been for some extraordinary errors on the French side. D'Erlon received so many countermanding orders in the course of the afternoon that his entire corps spent the day marching from Quatre Bras to Ligny and back again without ever joining in either battle. Due to similar confusion and misunderstanding, Lobau's corps never got into action and the net result of two French corps' lack of direct involvement was that neither the battles of Ligny nor Quatre Bras were decisive French victories.

Indeed the battle of Quatre Bras was nothing more than a confused draw. At the end of the day, the French had still not succeeded in capturing the crossroads despite a bloody contest on both sides. With the entire Anglo-Dutch army strung out on the road to Waterloo, Wellington had only managed to assemble less than half of his infantry at Quatre Bras – not enough to defeat Ney and not enough to help the Prussians to the east.

By the morning of June 17th, Napoleon's position was considerably better than that of the Allies. The Prussians were in full retreat to the north while a disorganised Anglo-Dutch army considered its next move. In fact, the decision was largely self-evident. Wellington knew that the only hope of stopping Napoleon's army was to stay close to the retreating Prussians. He therefore ordered Cole, Uxbridge, Hill and Orange to regroup near Waterloo at the top of the 'game map'. This would give him enough time to consolidate a position far enough away from the French and near enough to the Prussian course of retreat to enable Bulow's corps to march westwards to join him if needed.

The fact that he was able to do this without being mauled by the French was due to two factors: the weather and the inexplicable inactivity of Ney. Despite being orderd by Napoleon to attack Orange's outposts at Quatre Bras, Ney did nothing all morning on the 17th. By the time that Napoleon and the rest of the French army arrived at the crossroads at midday, Orange's corps was retreating northwards in pouring rain. The weather slowed up the French advance and enabled Wellington to get to Waterloo by nightfall. The reason for Ney's extraordinary behaviour – along with the previous day's muddle over d'Erlon's and Loubau's corps – is not something that can be simply explained in this brief summary. Perhaps it is easier to understand any historical battle of this nature when you realise the complexities in ordering thousands of human beings about, without the technical benefits of radio, radar or telecommunications. When you think that all communication on a battlefield (often itself obscured by thick smoke and galloping horses) was carried out by riders who might get lost, wounded or killed, then it is sometimes a wonder that anyone turned up on the day at all! Add to that the fact that maps were inaccurate, troop movements were at a snail's pace and rival jealousies between corps commanders often got in the way of common sense, and you will understand why the computer game contains a random 'orders gone astray' factor.

IF d'Erlon had moved correctly, IF Ney had woken up on time, IF Lobau had arrived at Ligny intact, IF the Prussians had joined up with the Allies before the main battle and IF Wellington had been more aware of Napoleon's rapid movements during the preceding day, THEN the course of history would have been different. Your job – while playing this game – is to see what 'could have happened if . . . .'

As it happened, the final battle of Waterloo on June 18th was the final defeat of Napoleon and the overthrow of 'Revolutionary France'. Napoleon was convinced that Blücher and the Prussian army was so badly defeated at Ligny that the Anglo-Dutch army would receive no assistance. He therefore left only Grouchy's corps to follow the Prussian army northwards while he took on the remaining Allied forces with his whole army at the top of the game map. Grouchy was not strong enough to stop a link-up between the British and the Prussians. It was this reason – more than any other – that spelt doom for Napoleon. When the first Prussian detachments arrived on Wellington's left wing in the late afternoon of June 18th, the battle of Waterloo (or 'Mount St Jean') was already some five hours old. Napoleon had launched wave after wave of infantry and cavalry against the British lines. Each assault had been driven off, but the Allied army was exhausted. The Prussian intervention gave vital relief to Wellington because it enabled him to regroup all his forces in the centre and leave the left flank to Blücher.

The climax of Waterloo was a final gamble by Napoleon. With time running out, the British still holding their positions and more and more Prussians arriving by the minute, he launched his picked troops – the Old Guard – straight at Wellington's centre. It was too late. The Guard was forced to retreat and – with the evident defeat of the best French troops – the entire French army was seized by despair and panic.

After three days of marching and fighting, the soldiers of Napoleon fell back towards the south. The Allies entered Paris on July 7th.

The memorable battle of Waterloo was not simply a one day event. The final battle on June 18th was the end result of Quatre Bras, Ligny, the march northwards and the pouring rain. It was also compounded by tactical and strategic errors on both sides as well as undoubted heroism. The Allied army lost 22,000 men – the French army around 25,000.

It is easy to say 'What would have happened IF?' You see if *you* can do any better.

The program

The program occupies – as you can see from the length of the listing – most of the available RAM on a 64. If you want to save space, you can always omit the instant replay facility (see below) by deleting line 25 and losing the A7, A8, A9, F7, F8 and F9 matrix variables. You can also lose lines 10000–20095 which should help on the memory storage problem.

Breakdown of listing

Lines	
5–84	Program data
102–110	Security check word input (to stop the other player from seeing your moves and orders!)
111–235	Display and input for moves
240–299	Checking of moves
300–399	The computer moves both armies simultaneously and checks for contact and combat
400–960	Limited combat if not enough forces in contact with each other
2000–3100	Orders put in subroutine

5000–9999	Full combat and transfer to 'battle map'
10000–20095	Replay display to show both sides where they went wrong – or right!
30000–30310	Four compass display subroutines
40000–40150	Battle map orders input subroutine
50000–50086	Losses calculation

The main part of the simultaneous action is centred round the display and moving input lines 111–235. Lines 123–145 will print out the status of all your forces whilst lines 150–197 display your own forces as well as any enemy units who are within sight of yours. This depends on the strength of your cavalry compared to the enemy unit. Therefore, in some situations, you will be able to see the enemy, and he will not be able to see you.

Lines 800–850 display the main map border with trees and towns upon it.

The main variables used in this program are as follows [French units are (1,0–9), Allied units are (0,0–9)]:

H(1,9)	The number, in thousands, of cavalry in each unit
A(1,9)	The number of gunners
I(1,9)	The number of infantry
N$(1,9)	The name of the unit's commanding officer
P(1,9)	The position of each unit (0–999) on the map
N(1,9)	New order to add to P(1,9) for a new move
D$(1,9)	The initial letter by which each unit is displayed
M(1,9)	Morale and efficiency of each unit on a scale of 0–10
A7(23,9)	All (23,9) matrices are for the replay display only
T(39)	Forest squares on the main map
X(9)	Town squares on the map
C(24)	Main position alterations for each input move
L(7)	Main display border screen locations

WATERLOO

```
5 REM WATERLOO C.C.1981-3
10 REM WATERLOO---WALWYN
15 GOSUB63900:UN$(0)=U7$:UN$(1)=U9$:UJ$(0)=U2$:UJ$(1)=U4$
20 DIM H(1,9),A(1,9),I(1,9),N$(1,9),P(1,9),N(1,9),D$(1,9),M(1,9),G(7),K(7)
22 L(3)=US+250:L(7)=US+260:L(0)=US+490:L(1)=500+US:L(2)=US+480:L(6)=US+510
23 L(4)=US+730:L(5)=US+740
24 REM A9=ALLIED REPLAY,F9=FRENCH REPLAY
25 DIM A7(23,9),F7(23,9),A8(23,9),F8(23,9),A9(23,9),F9(23,9)
26 DIM Z(1),T(39),C(24),A5(26),F5(26)
27 A5(0)=1236:F5(0)=966:G=US+239:UC=UC+239:UK=54272:D=1000:T1=13:T2=16:T3=1
28 FOR B=0TO1
30 FOR J=0TO9
32 READ I(B,J),A(B,J),H(B,J),P(B,J)
34 NEXT J:NEXT B
37 FOR B=0TO1
39 FOR J=0TO9
40 READ N$(B,J),D$(B,J)
41 A7(0,J)=P(0,J):A9(0,J)=P(0,J):F7(0,J)=P(1,J):F9(0,J)=P(1,J)
42 NEXT J:NEXT B
46 FORJ=0TO39
49 READ T(J):NEXT J
50 FOR J=0TO24
```

```
52 READ C(J):NEXT J
53 FOR J=0TO9
54 M(0,J)=6:M(1,J)=7
55 READ X(J):NEXT J
60 DATA 0,0,3,56,26,2,2,380,19,2,2,17,26,2,2,327,0,0,5,86
62 DATA 0,0,3,513,25,2,3,508,25,2,3,509,19,2,2,552,24,2,3,396
64 DATA 0,0,3,708,18,2,2,669,16,2,3,626,14,2,2,668,0,0,5,671
66 DATA 0,0,3,580,21,2,3,540,16,2,2,621,11,2,2,624,0,0,5,579
68 DATA WELLINGTON,W,ORANGE,O,COLE,C,HILL,H,UXBRIDGE,U
70 DATA BLUCHER,Q,ZIETEN,Z,PIRCH,P,THIELMANN,T,BULOW,B
72 DATA NAPOLEON,X,GROUCHY,Y,VANDAMME,V,GERARD,G,MILHAUD,M
74 DATA NEY,N,REILLE,R,D'ERLON,E,LOBAU,L,KELLERMANN,K
76 DATA 15,16,18,19,542,58,458,302,303,264,265,266,225,226,227,229,188,187
78 DATA 189,190,191,495,151,418,417,463,296,502,503,300,456,138,387,429
80 DATA 566,684,531,661,663,664,0,1,40,-1,-40,2,41,80,39,-2,-41,-80,-39
82 DATA 3,42,81,120,79,38,-3,-42,-81,-120,-79,-38
84 DATA 3,114,96,298,369,419,514,550,627,699
102 INPUT"▙ALLIES CODE WORD";C$(0)
106 INPUT"▙FRENCH CODE WORD";C$(1)
110 IF T3=23 THENPRINT"▙TIME'S UP!  END OF GAME.":END
111 FOR B=0 TO 1
112 POKEUB,UF:POKEUG,UR:PRINTUJ$(B);"▙" N$(B,0)"'S CODE WORD
115 INPUT"▓";C$
117 IF C$<>C$(B)GOTO112
```

```
123 PRINTUF$;"▙ INF.    ART.   CAV.  MORALE   UNIT
124 PRINT"****************************************"
125 FOR J=0TO9:PRINTUJ$(B);
135 PRINTI(B,J)*D;TAB(8)A(B,J)*D;TAB(15)H(B,J)*D;TAB(22)"("M(B,J)") "N$(B,J)
137 PRINTUF$;"────────────────────────────────────────
140 NEXT J
143 PRINT"▓▓PRESS ANY KEY■
145 GET A$:IF A$=""GOTO145
150 POKEUG,U6:POKEUB,UR:PRINT"▙":GOSUB800:PRINTUN$(B);
153 IF B=0 THEN R=1
155 IF B=1 THEN R=0
160 FOR J=0TO9
165 FOR K=0TO9
170 IF M(B,J)=0 OR M(R,K)=0 THEN194
173 POKE G+P(B,J),ASC(D$(B,J))-64:POKEUC+P(B,J),10+B*4
175 PRINTUN$(B);"▓REPORTS FROM "N$(B,J)" ("D$(B,J)")
178 IF H(B,J)>H(R,K) THEN Y=24
180 IF H(B,J)<=H(R,K) THEN Y=12
182 IF H(B,J)<=0 THEN Y=0
184 FOR L=0 TO Y
187 IF P(B,J)<>P(R,K)+C(L) GOTO192
190 POKE G+P(R,K),ASC(D$(R,K))+64:POKEUC+P(R,K),10+4*R
192 NEXTL
194 NEXTK
```

```
196 PRINT"▣"TAB(17)"      "
197 NEXT J
200 FOR J=0TO9
210 IFM(B,J)=0 THEN 235
214 PRINT"▣                   "
215 IF N(B,J)>80 THEN PRINT"▣"N$(B,J)" IS IN A COMBAT ZONE":FORX=1TO1000:NEXTX
216 IF N(B,J)>80 THEN N(B,J)=0:GOTO235
220 PRINT"▣                   "
225 GOSUB3000
226 PRINTUN$(B);"▣"N$(B,J)" ("D$(B,J)")'S ORDERS?"
230 GET A$:IFA$=""THEN 230
231 GET B$:IFB$=""THEN 231
232 GOSUB2000:PRINTUN$(B);
233 IF W5=1 THEN PRINT"▣ORDERS NOT UNDERSTOOD -TRY AGAIN!":FOR W=1TO1500:NEXTW
234 IF W5=1 THEN W5=0:GOTO220
235 NEXT J
240 POKEUG,U1:PRINTUJ$(B);"▣▣CHECKING YOUR ORDERS...██
245 FOR J=0TO9
250 IF M(B,J)=0 GOTO295
253 Y=4
255 IF A(B,J)+I(B,J)=0 THEN Y=12
260 S%=RND(1)*50
262 FORL=0TO Y
264 IF N(B,J)=C(L) GOTO 270
266 NEXT L
267 PRINT"▣ILLEGAL MOVE FOR "N$(B,J)
268 N(B,J)=0
270 IF S%>4 GOTO 278
271 PRINT"▣"N$(B,J)"'S ORDERS WENT ASTRAY
272 N(B,J)=C(S%)
278 FOR L=0TO39
280 IF P(B,J)=T(L)GOTO283
281 NEXT L
282 GOTO285
283 Q=RND(1)*10:IF Q<3 GOTO 285
284 PRINT"▣"N$(B,J)" IS LOST IN FORESTS":N(B,J)=0
285 IF N(B,J)+P(B,J)<2 OR N(B,J)+P(B,J)>719 GOTO290
286 FOR L=1TO20
287 IF N(B,J)+P(B,J)=40*L OR N(B,J)+P(B,J)=40*L-39 GOTO290
289 GOTO295
290 PRINT"▣"N$(B,J)" CAN'T MOVE OFF THE MAP!
292 N(B,J)=0
295 NEXT J
297 PRINTU0$;"▣▣▣THAT'S YOUR MOVES CHECKED█
298 FOR J=1TO2500:NEXT J
299 NEXT B
300 FOR B=0TO1
305 FOR J=0TO9
```

```
389 PRINT"■PRESS ANY OTHER KEY TO CONTINUE WITH
390 PRINT"■THE PRESENT GAME.":A2=0:F2=0
391 FOR J=0TO9
392 A2=A2+M(0,J)*(I(0,J)+A(0,J)+H(0,J)):F2=F2+M(1,J)*(I(1,J)+A(1,J)+H(1,J))
393 NEXT J
394 A5(T3-1)=INT(A2)-T3*10:F5(T3-1)=INT(F2)+T3*10
395 PRINT"■■■TOTAL ALLIED PTS="A5(T3-1):PRINT"■■TOTAL FRENCH PTS="F5(T3-1)"■
396 GET A$:IF A$=""THEN 396
397 IF A$="Z" THEN M1=T1:M2=T2:M3=T3:GOTO10000
398 IF T3<23 THEN 110
399 PRINT"■END OF GAME - TIME'S UP":FOR I=1TO2000:NEXT I:A$="Z":GOTO397
400 A8(T3,C8)=P(0,J):F8(T3,C8)=P(1,K):C4=P(0,J):C5=P(1,K):C8=C8+1:XS=0
401 POKEUG,U2:POKEUB,U4:FORA=1TO230:NEXTA:POKEUG,U4:POKEUB,U2:FORA=1TO230:NEXTA
405 Z(0)=0:Z(1)=0:POKEUG,UE:POKEUB,UF:FOR A=1TO7:PRINT"■";UF$;
406 IF A=1 THEN PRINT"COMBAT BETWEEN...
407 IF A>1 AND A<4 THEN PRINT"ARTILLERY COMBAT PHASE...
408 IF A>3 THEN PRINT"GENERAL SKIRMISHING...
409 IF A<7 THEN PRINT"■INFANTRY▒▒ARTILLERY▒▒CAVALRY▒▒UNIT
410 FOR B=0TO1
413 IF A>1 AND Z(B)<=0 THEN PRINTTAB(13)U6$;"■***WITHDRAW***":A=7
414 FOR Y=0TO9
415 FOR R=0TO4
416 F=1:P=J:C=-40
417 IF B=1 THEN F=0:P=K:C=40
```

```
310 P(B,J)=P(B,J)+N(B,J)
311 A7(T3,J)=P(0,J):F7(T3,J)=P(1,J)
313 N(B,J)=0
315 NEXT J:NEXT B
350 POKEUG,UR:POKEUB,U6:PRINT"▙"
352 PRINTU6$;"M O V E S   A N D   C O M B A T . . . .":C8=0
353 FOR J=0TO9
355 FOR K=0TO9
360 FOR L=0TO4
362 IF N(1,K)>0 THEN 375
363 IF M(0,J)=0 OR M(1,K)=0 THEN 380
364 IF N(0,J)>0 THEN 380
365 IF P(0,J)=P(1,K)+C(L)GOTO400
370 NEXT L
375 NEXT K
380 NEXT J
381 FOR J=0TO9
382 A9(T3,J)=P(0,J):F9(T3,J)=P(1,J):NEXTJ
383 T1=T1+1:T3=T3+1
384 IF T1=21 THEN T1=10:T2=T2+1
385 PRINTU6$;"▙MOVES & COMBAT FINISHED
386 PRINT"▓▓THE TIME IS NOW"T1".00 ON JUNE"T2
387 PRINTUF$;"▓▓▓PRESS A 'Z' TO INTERUPT THE GAME AND
388 PRINT"▓HAVE AN 'ACTION REPLAY' OF YOUR MOVES.
```

```
418 Q=INT(RND(1)*6+1)
419 S=INT(RND(1)*6+1)
420 IF XS=0 AND N(B,Y)>0 THEN 860
425 IF P(B,P)<>P(B,Y)+C(R) GOTO860
427 IF M(B,Y)=0 THEN 860
429 IF XS=0 AND A=7 THEN N(B,Y)=1
430 ON A GOTO 450,500,500,700,700,700,900
450 V(B)=V(B)+A(B,Y)*M(B,Y)
460 GOSUB950
462 IF Y=0 OR Y=5 THENPRINT"...AND "N$(B,Y)" WILL BOOST MORALE!":Z(B)=Z(B)+60
464 FOR X=0TO9
465 IF P(B,Y)<>X(X) GOTO468
466 PRINT"...AND THEY ARE IN A TOWN!":Z(B)=Z(B)+I(B,Y)*4
468 NEXT X
469 Z(B)=Z(B)+(I(B,Y)+A(B,Y)+H(B,Y))*M(B,Y)
470 GOTO860
500 IF V(B)*Q>=V(F)*S THEN 512
502 Z(B)=Z(B)-V(F)/6.5*S:A(B,Y)=A(B,Y)-V(F)*Q/285
504 I(B,Y)=I(B,Y)-V(F)*Q/135:H(B,Y)=H(B,Y)-V(F)*Q/805
512 GOSUB950
520 GOTO860
700 IF Z(B)*Q>Z(F)*S GOTO708
702 I(B,Y)=I(B,Y)-Z(F)*Q/614
704 H(B,Y)=H(B,Y)-Z(F)*Q/D/4.5
```

```
705 A(B,Y)=A(B,Y)-Z(F)*Q/D/5.5
706 Z(B)=Z(B)-S*4
708 I(B,Y)=I(B,Y)-Z(F)*S/D/4.5
710 GOSUB 950
720 GOTO860
800 FOR A=0TO39:POKE G-A,43:POKE G+760-A,43:POKEUC-A,U8:POKEUC+760-A,U8
803 NEXT A
805 FOR A=1TO19:POKE G+40*A,43:POKE G-39+40*A,43:POKEUC+40*A,U8
808 POKEUC-39+40*A,U8:NEXT A
809 IF D7>0 THEN RETURN
810 FOR A=0TO9
812 POKE G+X(A),102:POKEUC+X(A),UR
814 NEXT A
830 FOR A=0TO39
832 POKE G+T(A),88:POKEUC+T(A),U3:NEXT A
850 RETURN
860 NEXT R
862 IF I(B,Y)<=0 AND H(B,Y)<=0 AND A(B,Y)<=0 THEN M(B,Y)=0
863 IF M(B,Y)<=0 THEN M(B,Y)=0:I(B,Y)=0:A(B,Y)=0:H(B,Y)=0:P(B,Y)=0
865 NEXT Y
870 PRINTUF$;"───────────────────────────────────────
875 NEXT B
876 Z(0)=INT(Z(0)):Z(1)=INT(Z(1)):PRINT"■BATTLE PTS.■ "U2$;"ALLIES"Z(0);
877 PRINTU4$;"FRENCH"Z(1)
```

```
958 PRINTUJ$(B);"█"I(B,Y)*D,A(B,Y)*D,H(B,Y)*D"   "N$(B,Y)
960 RETURN
2000 N(B,J)=9
2005 IF A$="N" AND B$="1" THEN N(B,J)=-40
2010 IF A$="N" AND B$="2" THEN N(B,J)=-80
2020 IF A$="N" AND B$="E" THEN N(B,J)=-39
2030 IF A$="N" AND B$="W" THEN N(B,J)=-41
2040 IF A$="E" AND B$="1" THEN N(B,J)=1
2050 IF A$="E" AND B$="2" THEN N(B,J)=2
2060 IF A$="W" AND B$="1" THEN N(B,J)=-1
2070 IF A$="W" AND B$="2" THEN N(B,J)=-2
2080 IF A$="S" AND B$="1" THEN N(B,J)=40
2090 IF A$="S" AND B$="2" THEN N(B,J)=80
2100 IF A$="S" AND B$="W" THEN N(B,J)=39
2110 IF A$="S" AND B$="E" THEN N(B,J)=41
2120 IF A$="0" AND B$="0" THEN N(B,J)=0
2130 IF N(B,J)=9 THEN W5=1:N(B,J)=0:RETURN
2135 PRINT"█████                       "
2140 PRINTUR$;"██████"N$(B,J)"'S ORDERS="A$+B$"█
2200 RETURN
3000 PRINTUU$;"█"TAB(30)"N2
3010 PRINT TAB(27)"NW N1 NE
3020 PRINT T1".00 JUNE"T2 TAB(24)"W2 W1 00 E1 E2
3030 PRINT"                          SW S1 SE
```

```
878 PRINTUF$;"■■PRESS ANY KEY■
879 GET A$:IFA$=""GOTO879
880 IF A=3 AND Z(0)>100 AND Z(1)>100 AND C4<>C5 THEN 5000
886 NEXT A
888 Z(0)=0:Z(1)=0:V(0)=0:V(1)=0
889 POKEUG,UR:POKEUB,U6:PRINT"▙"
890 PRINTU6$;"M O V E S   A N D   C O M B A T . . . .":GOTO380
900 IF Z(B)*Q*1.5>Z(F)*S THEN PRINTUJ$(B);"■"N$(B,Y)" HOLDS FIRM":GOTO860
910 Q%=RND(1)*6+1
911 IF Q%<5 THEN M(B,Y)=M(B,Y)-1
914 PRINTUJ$(B);"■"N$(B,Y)" FALLS BACK
915 A(B,Y)=A(B,Y)-Z(F)/825
916 A(B,Y)=INT(A(B,Y)*D)/D
917 IF A(B,Y)<=0 THEN A(B,Y)=0
918 IF M(B,Y)<4 THEN C=C*2:PRINTU0$;"...AND IS ROUTED!":M(B,Y)=M(B,Y)-1
920 P(B,Y)=P(B,Y)+C:N(B,Y)=0
925 IFP(B,Y)<2ORP(B,Y)>719THENM(B,Y)=0:PRINTUJ$(B);"■"N$(B,Y)" HAS RUN AWAY!
930 GOTO860
950 IF A(B,Y)<=.03 THEN A(B,Y)=0
952 IF I(B,Y)<=.03 THEN I(B,Y)=0
954 IF H(B,Y)<=.03 THEN H(B,Y)=0
955 A(B,Y)=INT(A(B,Y)*D)/D
956 H(B,Y)=INT(H(B,Y)*D)/D
957 I(B,Y)=INT(I(B,Y)*D)/D
```

```
3040 PRINT TAB(30)"S2
3100 RETURN
5000 REM COMBAT.
5005 C0=7:TT=0:XS=1:POKEUB,UU:PRINT"█":POKEUG,U6
5010 PRINTUE$;"█WAIT WHILE I SET UP THE BATTLE MAP...
5011 PRINT"███THIS IS THE COMBAT ZONE ENLARGED SO YOU█ CAN MOVE ABOUT.
5012 PRINT"███WHEN ASKED FOR ORDERS, YOU MAY ONLY
5013 PRINT"█MOVE ONE UNIT.PRESS THE UNIT'S LETTER
5014 PRINT"█FOLLOWED BY THE LETTER OF DIRECTION.
5015 PRINT"██████N.B. THE COMPASS IS AT THE TOP.
5016 PRINT"█IF YOU DO NOT WISH TO MOVE,PRESS '00'.
5017 PRINT"██TOWNS ARE MARKED:"UR$;"▒▒▒▒▒▒▒▒ ";UE$;"FOREST:"U3$;"♣♣♣♣♣♣♣
5020 FOR Y=0TO9
5030 FOR R=0TO4
5040 IFC5<>P(0,Y)+C(R) AND C4<>P(0,Y)+C(R) THEN 5100
5050 N(0,Y)=C4+C5
5100 NEXT R:NEXT Y
5110 FOR Y=0TO9
5120 FOR R=0TO4
5130 IFC4<>P(1,Y)+C(R) AND C5<>P(1,Y)+C(R) THEN 5200
5140 N(1,Y)=C4+C5
5200 NEXT R:NEXT Y
5300 C1=C5-C4
5310 C2=-1
```

```
5315 IF C1=0 THEN C0=4:C1=40
5320 IF C1=-40 THEN C2=+1
5325 IF C1=1 THEN C2=40
5330 IF C1=-1 THEN C2=-40
5340 G(0)=C4:G(1)=C4+C1:G(2)=C4-C1:G(3)=C4-C2:G(4)=C4+C2:G(5)=C4+C1+C2
5350 G(6)=C4+2*C1:G(7)=C4+C1-C2
5405 FOR R=0TO C0
5407 K(R)=0
5410 FOR Y=0 TO 39
5420 IF G(R)=T(Y) THEN K(R)=1
5425 NEXT Y
5430 FOR Y=0 TO 9
5440 IF G(R)=X(Y) THEN K(R)=2
5442 NEXT Y:NEXT R
5443 PRINTUE$;"██PRESS ANY KEY WHEN READY█
5444 GET A$:IF A$="" THEN 5444
5445 POKEUG,UE:PRINTUE$;"█SITUATION AT"T1"."TT:POKEUG,U6
5480 FOR Y=1 TO 17
5482 POKE L(3)+Y*40,43:POKE L(7)+Y*40,43:POKE US+270+Y*40,43
5484 NEXT Y
5486 FOR Y=0 TO 39
5487 POKE US+240+Y,64
5488 POKE L(2)+Y,43:POKE US+720+Y,43
5490 NEXT Y
```

```
5500 REM NOW LAY OUT THE BATTLE MAP
5502 D7=88
5505 FOR R=0TOC0
5507 D7=32
5510 IF K(R)=2 THEN D7=102:UP=12
5515 IF K(R)=1 THEN D7=88:UP=5
5520 FOR Y=0 TO 8
5525 POKE L(R)+Y+41,D7
5527 POKE L(R)+UK+Y+41,UP
5530 NEXT Y
5590 D7=0:NEXT R
5592 PRINTUU$;"■■■"TAB(13)"COMPASS...
5594 PRINTU7$;"■■A L L I E S■                         "U9$;"■F R E N C H■"
5595 PRINTUU$;:IF C1=0 OR C1=40 THEN GOSUB30000
5596 IF C1=-40 THEN GOSUB 30100
5597 IF C1=1 THEN GOSUB 30200
5598 IF C1=-1 THEN GOSUB 30300
5600 FOR R=0TO C0
5605 A1=80:F1=90:AK(R)=0:FK(R)=0
5610 FOR Y=0TO9
5620 IF P(0,Y)=G(R) THEN A1=A1+1:GOTO5630
5625 IF P(1,Y)=G(R) THEN F1=F1-1:GOTO5660
5628 GOTO 5695
5630 IF I(0,Y)>0 THEN POKE L(R)+A1,ASC(D$(0,Y))-64:POKE L(R)+A1+40,214
```

```
5635 IF I(0,Y)>0 THEN POKE L(R)+UK+A1,10:POKE L(R)+UK+A1+40,10
5640 IF H(0,Y)>0 THEN POKE L(R)+A1+80,ASC(D$(0,Y))-64:POKE L(R)+A1+120,206
5642 IF H(0,Y)>0 THEN POKE L(R)+UK+A1+80,10:POKE L(R)+UK+A1+120,10
5644 IF Y=0 OR Y=5 THEN AK(R)=AK(R)+60
5645 AK(R)=AK(R)+M(0,Y)*(I(0,Y)+H(0,Y)+K(R)/3*I(0,Y))
5647 IF AB(0)=Y THEN AK(R)=AK(R)-M(0,Y)*K(R)/3*I(0,Y)
5650 GOTO 5625
5660 IF I(1,Y)>0 THEN POKE L(R)+F1,ASC(D$(1,Y))-64:POKE L(R)+F1+40,214
5665 IF I(1,Y)>0 THEN POKE L(R)+UK+F1,14:POKE L(R)+UK+F1+40,14
5670 IF H(1,Y)>0 THEN POKE L(R)+F1+80,ASC(D$(1,Y))-64:POKE L(R)+F1+120,205
5672 IF H(1,Y)>0 THEN POKE L(R)+UK+F1+80,14:POKE L(R)+UK+F1+120,14
5674 IF Y=0 OR Y=5 THEN FK(R)=FK(R)+60
5675 FK(R)=FK(R)+M(1,Y)*(I(1,Y)+H(1,Y)+K(R)/3*I(1,Y))
5677 IF AB(1)=Y THEN FK(R)=FK(R)-M(1,Y)*K(R)/3*I(O,Y)
5695 NEXT Y:NEXT R
5700 FOR R=0 TO C0
5710 IF AK(R)>0 AND FK(R)>0 THEN 5750
5720 NEXT R
5730 GOTO6000
5750 FOR Y=0 TO 9
5752 Q=RND(1):S=RND(1)
5760 IF P(0,Y)=G(R) THEN I(0,Y)=I(0,Y)-S*FK(R)/140:H(0,Y)=H(0,Y)-S*FK(R)/650
5761 IF P(0,Y)=G(R) THEN A(0,Y)=A(0,Y)-S*FK(R)/750
5762 IF I(0,Y)<0 THEN I(0,Y)=0
```

```
6010 GOSUB 40000
6050 PRINTU9$;"▒FRENCH ORDERS...?"
6060 GOSUB 40000
6070 PRINT"▒                           "
7000 POKEUG,UE:PRINTUF$;"▒▒▒INFANTRY▒▒ARTILLERY▒▒CAVALRY▒▒UNIT▒▒
7001 FOR B=0 TO 1
7002 PRINTUF$;"────────────────────────────────────
7010 FOR Y=0 TO 9
7015 I(B,Y)=INT(I(B,Y)*D)/D
7016 A(B,Y)=INT(A(B,Y)*D)/D
7017 H(B,Y)=INT(H(B,Y)*D)/D
7020 IF N(B,Y)=C4+C5 THEN PRINTUJ$(B);I(B,Y)*D,A(B,Y)*D,H(B,Y)*D,N$(B,Y)"▒"
7030 NEXT Y
7040 NEXT B
7050 PRINTUF$;"▒▒BATTLE SITUATION AT"T1"."TT
7055 PRINT"▒▒PRESS ANY KEY WHEN READY█
7060 GET A$:IF A$="" THEN 7060
7080 IF TT=50 THEN 50000
9900 TT=TT+10
9905 P(0,AB(0))=P(0,AB(0))+AC(0)
9906 P(1,AB(1))=P(1,AB(1))+AC(1)
9910 FOR R=0 TO C0
9920 IF G(R)=P(0,AB(0)) THEN 9940
9925 NEXT R
```

```
5763 IF A(0,Y)<0 THEN A(0,Y)=0
5764 IF H(0,Y)<0 THEN H(0,Y)=0
5770 IF P(1,Y)=G(R) THEN I(1,Y)=I(1,Y)-Q*AK(R)/88:H(1,Y)=H(1,Y)-Q*AK(R)/650
5771 IF P(1,Y)=G(R) THEN A(1,Y)=A(1,Y)-Q*AK(R)/750
5772 IF I(1,Y)<0THEN I(1,Y)=0
5773 IF A(1,Y)<0 THEN A(1,Y)=0
5774 IF H(1,Y)<0 THEN H(1,Y)=0
5775 NEXT Y
5778 PK=PEEK(L(R)+41):UQ=PEEK(L(R)+UK+41)
5780 FOR B=0TO 7
5781 PRINT"SQQQQQQR"U7$;INT(AK(R))"■"
5782 PRINT"SQQQQQQ]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]R"U9$;INT(FK(R))"■"
5784 FOR Y=0 TO 8
5785 POKE L(R)+41+Y,105:POKEL(R)+UK+41+Y,1
5790 NEXT Y
5792 FOR Y=0 TO 8
5794 POKE L(R)+41+Y,PK:POKEL(R)+UK+41+Y,UQ
5796 NEXT Y
5797 PRINT"SQQQQQQ                                             "
5798 NEXT B
5799 GOTO5720
6000 IF TT=50 THEN A=7:GOTO6070
6002 AB(0)=0:AB(1)=0:AC(0)=0:AC(1)=0
6005 PRINTU7$;"SALLIES ORDERS...?                     "
```

```
9930 P(0,AB(0))=P(0,AB(0))-AC(0)
9940 FOR R=0 TO C0
9950 IF G(R)=P(1,AB(1)) THEN 9990
9955 NEXT R
9960 P(1,AB(1))=P(1,AB(1))-AC(1)
9990 GOTO5445
9999 PRINTUF$;"♥MOVES AND COMBAT":GOTO0375
10000 REM REPLAY
10002 POKEUG,UR:POKEUB,UE:PRINT"♥":POKEUG,U6
10005 T1=13:T2=16:T3=0
10010 PRINTUR$;"S▒▒▒▒▒SITUATION AT"T1".00 ON JUNE"T2"▒▒▒▒▒
10012 PRINT"▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒
10015 GOSUB800
10020 FOR J=0TO9
10021 IF T3=0 THEN 10028
10022 POKE A9(T3-1,J)+G,32:POKE G+F9(T3-1,J),32
10023 NEXT J
10024 FOR J=0TO9
10025 POKE G+A7(T3,J),ASC(D$(0,J))-64:POKEG+UK+A7(T3,J),10
10026 POKE G+F7(T3,J),ASC(D$(1,J))+64:POKEG+UK+F7(T3,J),14
10028 NEXT J
10030 FOR J=0TO9
10040 IF A8(T3,J)=0THEN 10085
10050 A8=PEEK(G+A8(T3,J)):F8=PEEK(G+F8(T3,J))
```

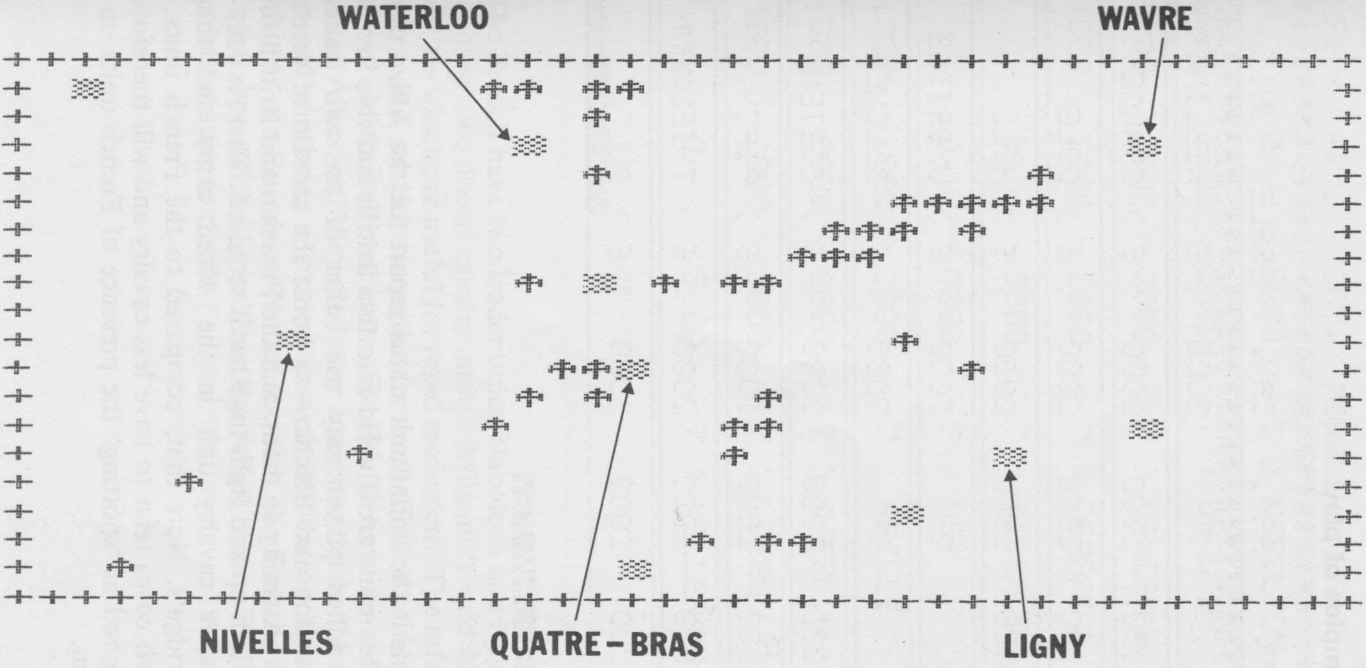
```
10060 FOR K=1TO30
10065 PRINTU1$;"SQ"TAB(17)"COMBAT"
10070 POKE G+A8(T3,J),ASC("*"):POKE G+F8(T3,J),ASC("*")
10072 POKE G+UK+A8(T3,J),10:POKE G+UK+F8(T3,J),14
10075 FOR I=1 TO 15:NEXT I
10080 POKE G+A8(T3,J),A8:POKE G+F8(T3,J),F8
10081 PRINTUR$;"SQ"TAB(17)"▒▒▒▒▒
10082 NEXT K
10085 NEXT J
10086 PRINTUR$J"SQQ▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒
10087 PRINTU7$;"SQQRALLIED PTS.="A5(T3);UR$;"   "U9$;"FRENCH PTS.="F5(T3)
10090 FOR J=0 TO9
10095 POKE G+A7(T3,J),32
10100 POKE G+F7(T3,J),32
10102 NEXT J
10103 FOR J=0TO9
10105 POKE G+A9(T3,J),ASC(D$(0,J))-64
10107 POKE G+UK+A9(T3,J),10
10110 POKE G+F9(T3,J),ASC(D$(1,J))+64
10112 POKE G+UK+F9(T3,J),14
10120 NEXT J
10122 PRINTUR$;"▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒
10124 PRINT"▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒
10130 PRINTU8$;"□RPRESS ANY KEY TO CONTINUE■
```

```
10140 GET A$:IF A$=""THEN 10140
10150 PRINTUR$;"□▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒
10200 T3=T3+1:T1=T1+1
10210 IF T1=21 THEN T1=10:T2=T2+1
10215 IF F5(T3)=0 OR A5(T3)=0 THEN 20000
10220 GOTO10010
20000 POKEUG,UF:PRINTUE$;"␣THAT'S YOUR LAST GAME RERUN FOR YOU.
20010 PRINT"▣▣IF YOU WISH TO CONTINUE WITH THE GAME
20020 PRINT"▣FROM THIS POINT, THEN TYPE 'C'.
20030 PRINT"▣▣IF YOU WISH TO SEE THE REPLAY AGAIN ,
20040 PRINT"▣THEN TYPE 'Z'.
20050 PRINT"▣▣IF YOU'VE HAD ENOUGH THEN TYPE 'X'
20060 GET A$:IF A$="" THEN 20060
20070 IF A$="C" THEN T1=M1:T2=M2:T3=M3:GOTO 110
20080 IF A$="Z" THEN 10000
20090 PRINT"␣THANKYOU & GOODNIGHT...
20095 END
30000 PRINT"▣
30010 PRINTTAB(25)"E":PRINTTAB(23)"N + S":PRINTTAB(25)"W"
30020 RETURN
30100 PRINT"▣":PRINTTAB(25)"W":PRINTTAB(23)"S + N":PRINTTAB(25)"E"
30110 RETURN
30200 PRINT"▣":PRINTTAB(25)"N":PRINTTAB(23)"W + E":PRINTTAB(25)"S"
30210 RETURN
```

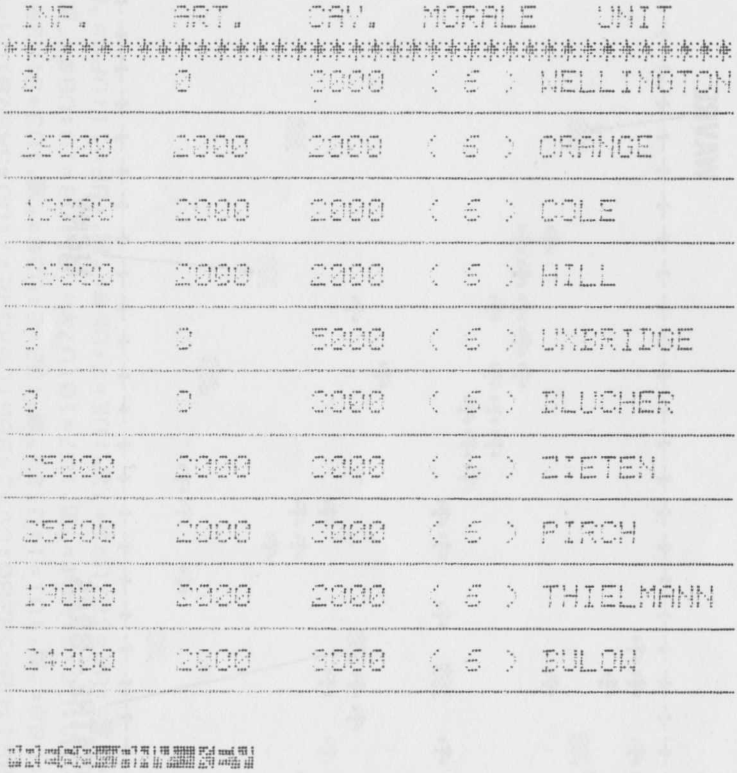
```
30300 PRINT"▣":PRINTTAB(25)"S":PRINTTAB(23)"E + W":PRINTTAB(25)"N"
30310 RETURN
40000 GET A$:IF A$="" THEN 40000
40010 GET B$:IF B$="" THEN 40010
40020 FOR B=0TO1
40030 FOR Y=0TO9
40040 IF D$(B,Y)<>A$ THEN 40100
40050 AB(B)=Y
40060 IF B$="N" THEN AC(B)=-40
40070 IF B$="S" THEN AC(B)=40
40080 IF B$="W" THEN AC(B)=-1
40090 IF B$="E" THEN AC(B)=1
40095 IF B$="0" THEN AC(B)=0
40100 NEXT Y:NEXT B
40150 RETURN
50000 AK=0:FK=0
50010 FORY=0 TO 9
50020 IF N(0,Y)=C4+C5 THEN AK=AK+M(0,Y)*(I(O,Y)+H(0,Y)+A(0,Y))
50030 IF N(1,Y)=C4+C5 THEN FK=FK+M(1,Y)*(I(1,Y)+H(1,Y)+A(1,Y))
50040 NEXT Y
50045 PRINT"␣THE END OF ONE HOUR'S FIGHTING...":Z(0)=AK:Z(1)=FK
50050 A=7
50086 GOTO 410
63900 REM COMMODORE 64 COLOUR/SOUND CODES
```

```
63902 US=1024:UC=55296:UG=53281:UB=53280:UV=54296:UA=54277:UD=54278:UH=54273
63905 UL=54272:UW=54276:U0=0:U0$="■":U1=1:U1$="▣":U2=2:U2$="▣":U3=5:U3$="▣"
63910 U4=6:U4$="▣":U5=8:U5$="◘":U6=9:U6$="▣":U7=10:U7$="⊠":U8=13:U8$="■"
63915 U9=14:U9$="◘":UU=4:UU$="▓":UR=12:UR$="▣":UE=7:UE$="▣":UF=11:UF$="⊠"
63930 RETURN

READY.
```

MAIN TOWNS ON THE MAP

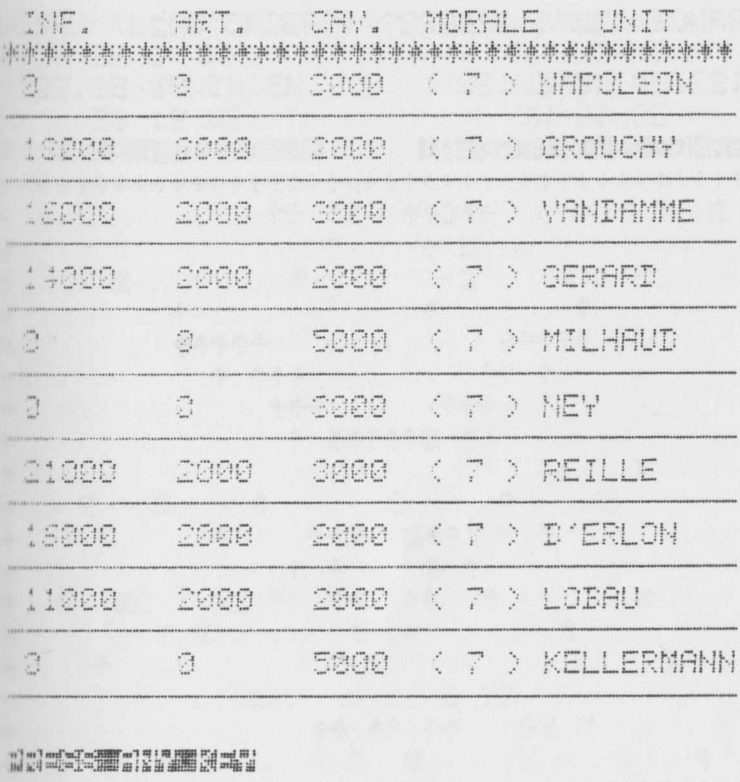

WATERLOO
WAVRE
NIVELLES
QUATRE – BRAS
LIGNY

Examples of play



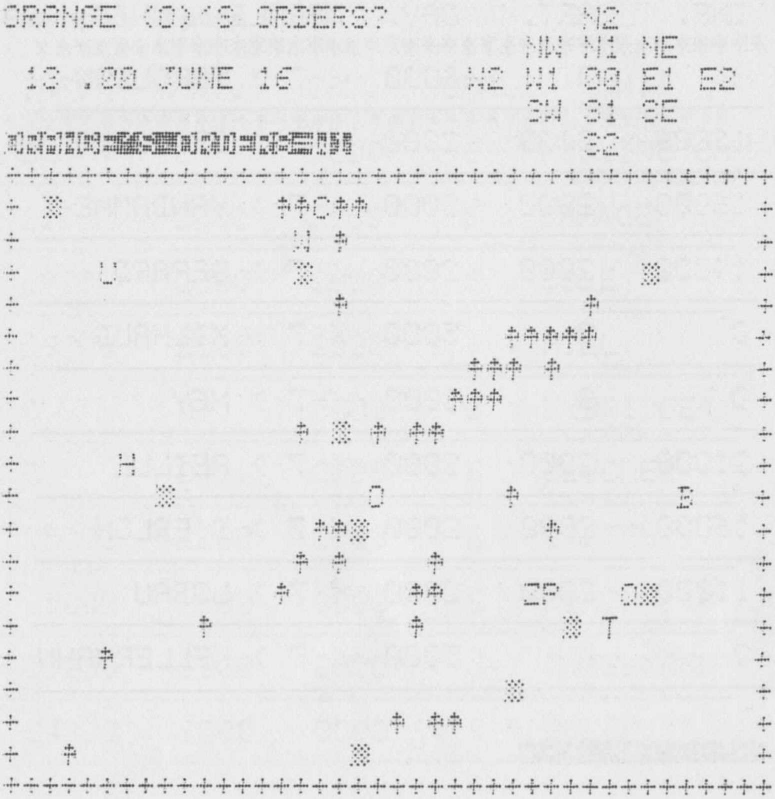
```
 INF.      ART.      CAV.    MORALE    UNIT
*******************************************
 0         0         3000    ( 6 ) WELLINGTON
-------------------------------------------
 25000     2000      2000    ( 6 ) ORANGE
-------------------------------------------
 19000     2000      2000    ( 6 ) COLE
-------------------------------------------
 25000     2000      2000    ( 6 ) HILL
-------------------------------------------
 0         0         5000    ( 6 ) UXBRIDGE
-------------------------------------------
 0         0         3000    ( 6 ) BLUCHER
-------------------------------------------
 25000     2000      3000    ( 6 ) ZIETEN
-------------------------------------------
 25000     2000      3000    ( 6 ) PIRCH
-------------------------------------------
 19000     2000      2000    ( 6 ) THIELMANN
-------------------------------------------
 24000     2000      3000    ( 6 ) BULOW
-------------------------------------------

[illegible]
```

This is the initial unit status report for the Allied player. The ten units are divided into five British and five Prussian. The Allied player may use either of the two leaders – Wellington and Blücher – to boost the morale of forces in close proximity to them, and the Prussian and British forces may join up and fight together if required. There is only one offensive cavalry unit in the Allied army and that is Uxbridge's. Note that, compared to the French units, the British corps tend to have less cavalry and will therefore be less good at 'spotting' the presence of French units on the screen.



```
INF.    ART.    CAV.   MORALE   UNIT
****************************************
0       0       3000   < 7 >   NAPOLEON
----------------------------------------
19000   2000    2000   < 7 >   GROUCHY
----------------------------------------
16000   2000    3000   < 7 >   VANDAMME
----------------------------------------
14000   2000    2000   < 7 >   GERARD
----------------------------------------
0       0       5000   < 7 >   MILHAUD
----------------------------------------
0       0       3000   < 7 >   NEY
----------------------------------------
21000   2000    3000   < 7 >   REILLE
----------------------------------------
16000   2000    2000   < 7 >   D'ERLON
----------------------------------------
11000   2000    2000   < 7 >   LOBAU
----------------------------------------
0       0       5000   < 7 >   KELLERMANN
----------------------------------------
```

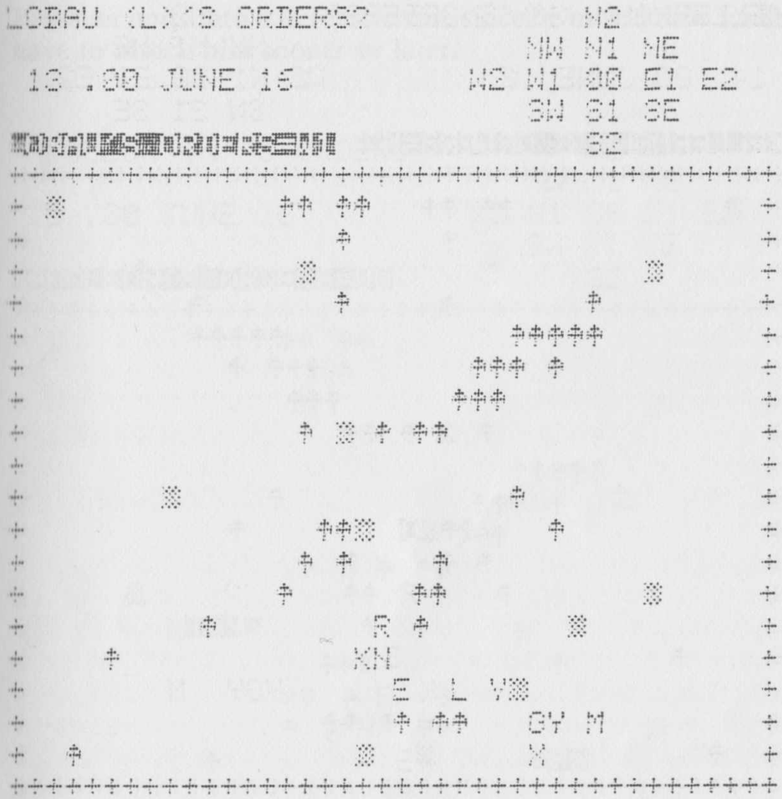
The French have two leader units, Napoleon and Ney, and also have two loose cavalry units – Milhaud's and Kellermann's – which are useful for rapid movement. The infantry, artillery and cavalry strengths for both French and Allied forces are historically accurate. The French have fewer forces than the Allies, but they are better concentrated on the initial map and can bring a greater strength to bear on either the British or the Prussians. Notice too that the French morale rating is one point higher than the Allies. This will change once losses start to occur.



```
ORANGE (O)'S ORDERS?              N2
                               NW N1 NE
 13.00 JUNE 16              W2 W1 00 E1 E2
                               SW S1 SE
                                  S2
```

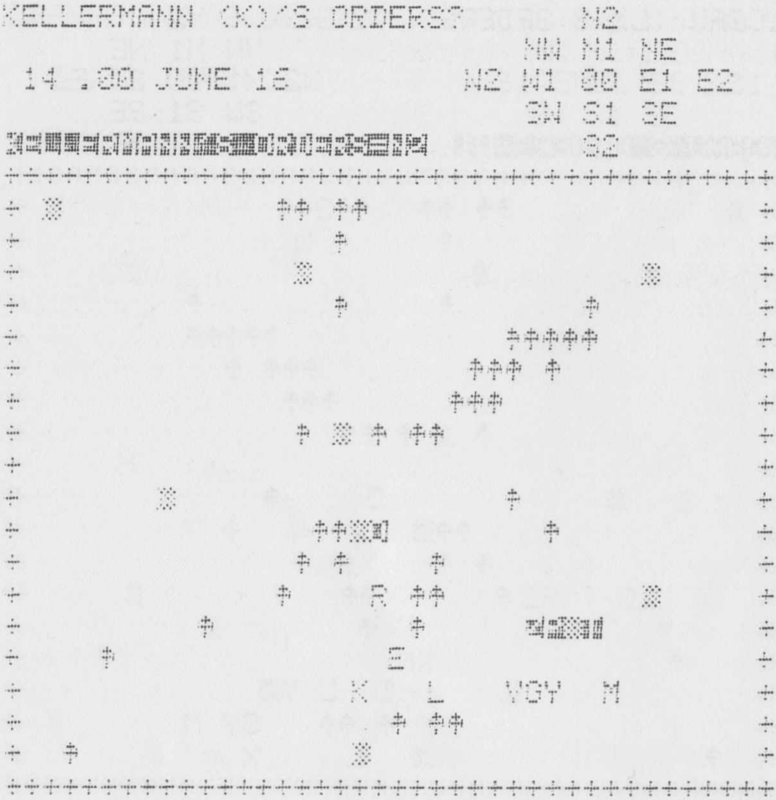
Once the French player is no longer looking at the screen, the Allied player examines the map as the units report in with information. To begin with, no units are in sight of each other, but after only one move it is possible for some to see each other, depending on what both players secretly order their units to do.

The Prussians (Z, P, Q, T, B) are grouped in the south-east round the town of Ligny. The central crossroads of Quatre Bras (in the centre of the map) is guarded by one British unit (O), and the other British units are to the north, near the village of Waterloo (units W and C) and to the west and north-west (units H and U).



```
LOBAU (L)'S ORDERS?                    N2
                                    NW N1 NE
 13 .00 JUNE 16                  W2 W1 00 E1 E2
                                    SW S1 SE
                                       S2
```

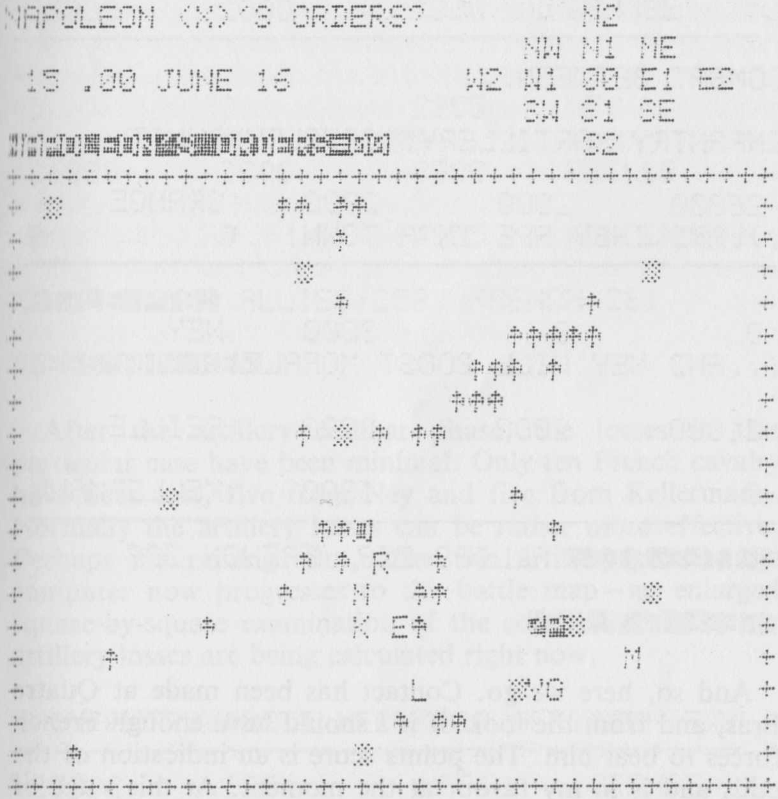
From the French side, the picture is somewhat different. A detachment of three units (R, N, K) are poised to advance on the Quatre Bras crossroads, while the main French army (M, G, Y, V, X) are within a few kilometres of the Prussians at Ligny. Two units (L, E) are able to move to either scene of action, and a crucial French decision at the beginning of the game is where to launch the main attack. Should you let Ney have all the reserves and capture the Quatre Bras area, thereby cutting off the two Allied armies from each other? Or should you attack the Prussians before they have a chance to organise themselves in a good defensive position at Ligny? Here I have chosen the former option. Lobau (L) has been ordered to the west.



```
KELLERMANN (K)'S ORDERS?                  N2
                                       NW N1 NE
 14.00 JUNE 16                      W2 W1 00 E1 E2
                                       SW S1 SE
                                          S2
```

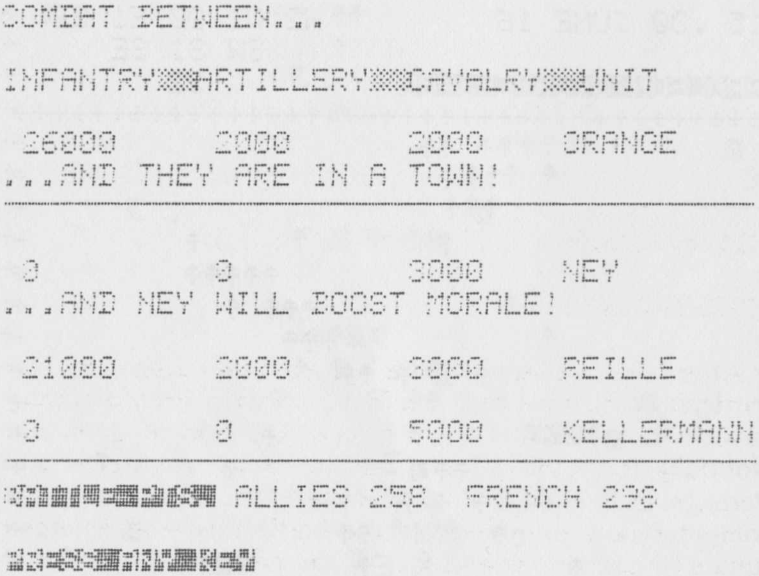
From now onwards, I shall play from the French point of view. One hour (one move) later, we can see the first Allied forces appearing (on reverse field) as they are 'spotted' by my units. Orange (O) has been seen one square to the east of Quatre Bras, and my units R, E and K are slowly moving up to attack. Unit L (Lobau) will take several hours to join them. I should have enough there without Lobau to drive Orange to the north. My leader unit Ney (N) is also there, but since he's on the same square as Reille you can't see him. There is no restriction on the number of units that may be occupying the same square. To the south-east three Prussian units have been spotted around Ligny (Z, P, T), and I shall take my time to consolidate my forces before I attack. This will also, alas, give my opponent the time to organise his

Prussian units into a defensive role since he must know I will have to attack him sooner or later.



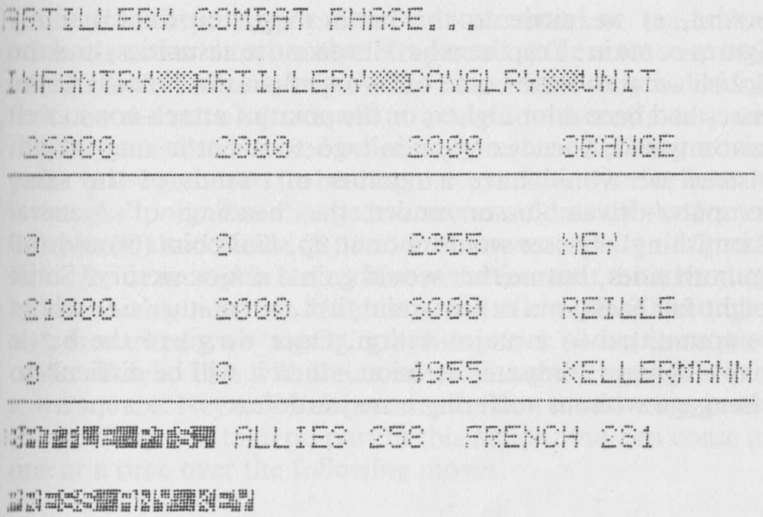
```
NAPOLEON (X)'S ORDERS?                N2
                                   NW N1 NE
 15 .00 JUNE 16                 W2 W1 00 E1 E2
                                   SW S1 SE
                                      S2
```

And here is the position with both our moves calculated from the last lot of orders. So far still no combat, but this next hour will see some action. Units R, N and K, and maybe E, will all be able to attack Orange who is now sitting in his town square. This will help him in defence, but I should have enough to drive him out. I have ordered Napoleon to stay put (00), and my forces around Ligny are now all stacked under the two units V and G. My cavalry piece Milhaud (M) has been dispatched to the north-east to make sure that the other Prussian corps – Bülow (B) – is spotted well before it joins the action. I don't know what my opponent's plans are, but I must assume he is bringing all his British units as fast as he can down to Quatre Bras. They will however take many hours to get to Orange.



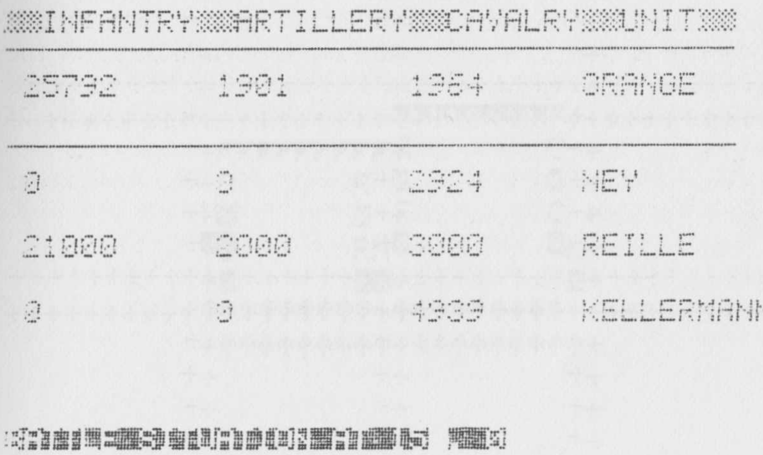
```
COMBAT BETWEEN...

INFANTRY▒▒▒ARTILLERY▒▒▒CAVALRY▒▒▒UNIT

 26000       2000         2000     ORANGE
...AND THEY ARE IN A TOWN!
----------------------------------------------

 0           0            3000     NEY
...AND NEY WILL BOOST MORALE!

 21000       2000         3000     REILLE

 0           0            5000     KELLERMANN
----------------------------------------------

[illegible] ALLIES 258  FRENCH 298

[illegible]
```

And so, here we go. Contact has been made at Quatre Bras, and from the look of it I should have enough French forces to beat him. The points score is an indication of the odds and is in my favour at the moment. At this stage of combat, the computer takes over the action automatically. If neither side loses heavily in the forthcoming artillery phase, we may well progress to the battle map, and then I can order individual units to the attack.



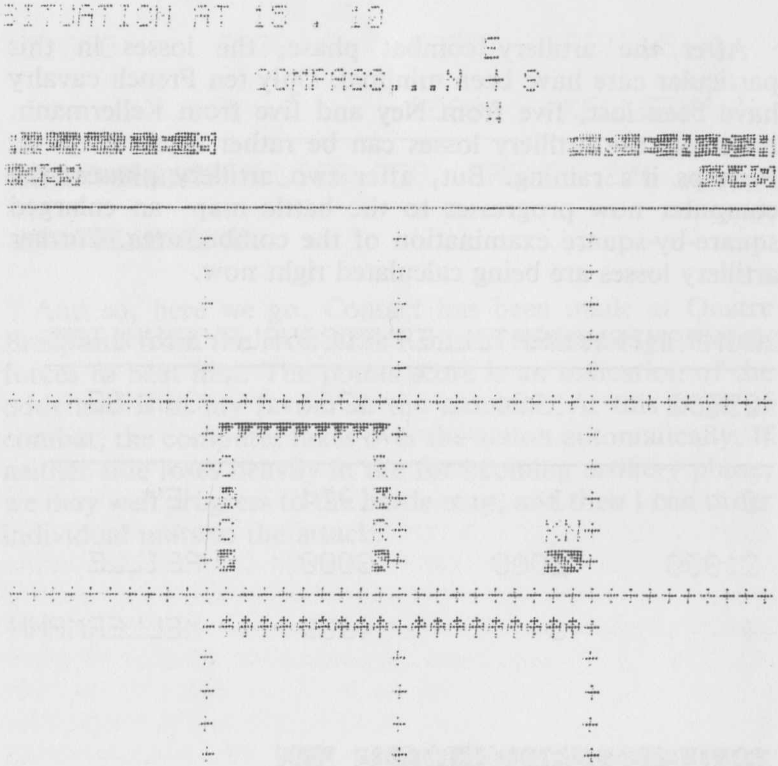
```
ARTILLERY COMBAT PHASE..
INFANTRY▒▒ARTILLERY▒▒CAVALRY▒▒UNIT
 25000     2000       2000    ORANGE
------------------------------------
 0         0          2355    NEY
 21000     2000       3000    REILLE
 0         0          4955    KELLERMANN
------------------------------------
              ALLIES 258  FRENCH 281
```

After the artillery combat phase, the losses in this particular case have been minimal. Only ten French cavalry have been lost, five from Ney and five from Kellermann. Normally the artillery losses can be rather more effective. Perhaps it's raining. But, after two artillery phases, the computer now progresses to the battle map – an enlarged square-by-square examination of the combat area. Further artillery losses are being calculated right now.



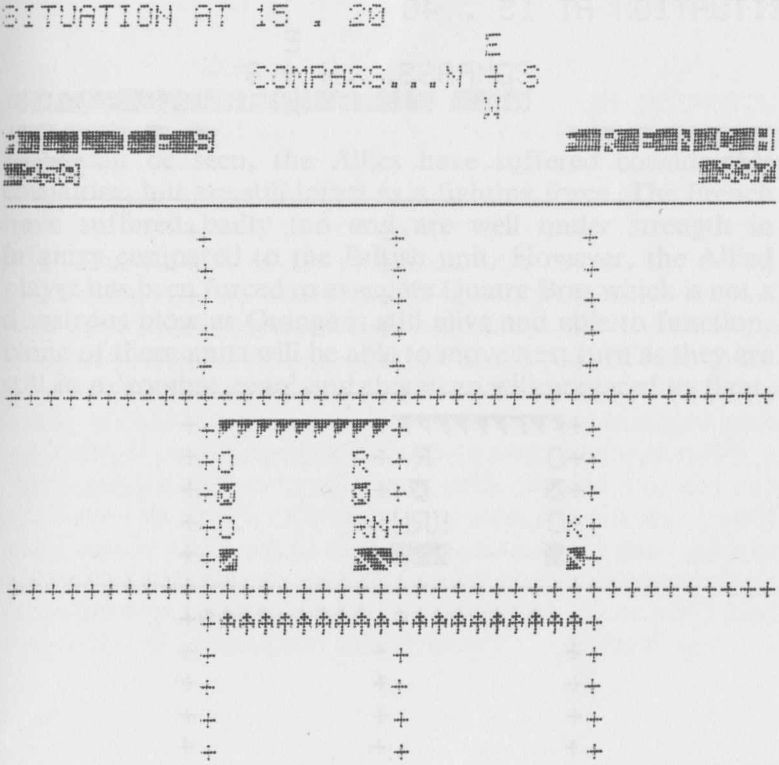
```
▒▒INFANTRY▒▒ARTILLERY▒▒CAVALRY▒▒UNIT▒▒
--------------------------------------
 25792      1901        1964    ORANGE
--------------------------------------
 0          0           2924    NEY
 21000      2000        3000    REILLE
 0          0           4939    KELLERMANN
```

And, as we move to the battle map, the final artillery figures come in. Yes, there have been more casualties, and the British seem to have come off worse than the French. If the losses had been a lot higher, or the point of attack not so well concentrated, then we wouldn't go to a battle map at all. Instead we would have a number of rounds of the same computer-driven losses under the heading of 'general skirmishing'. Losses would mount up, and points would fall on both sides, but neither would gain a major victory. Some might fall back, and others stand firm, but neither side would be committed to a major action. Once we go to the battle map – again a computer decision – then it will be difficult to disengage without suffering a major defeat.



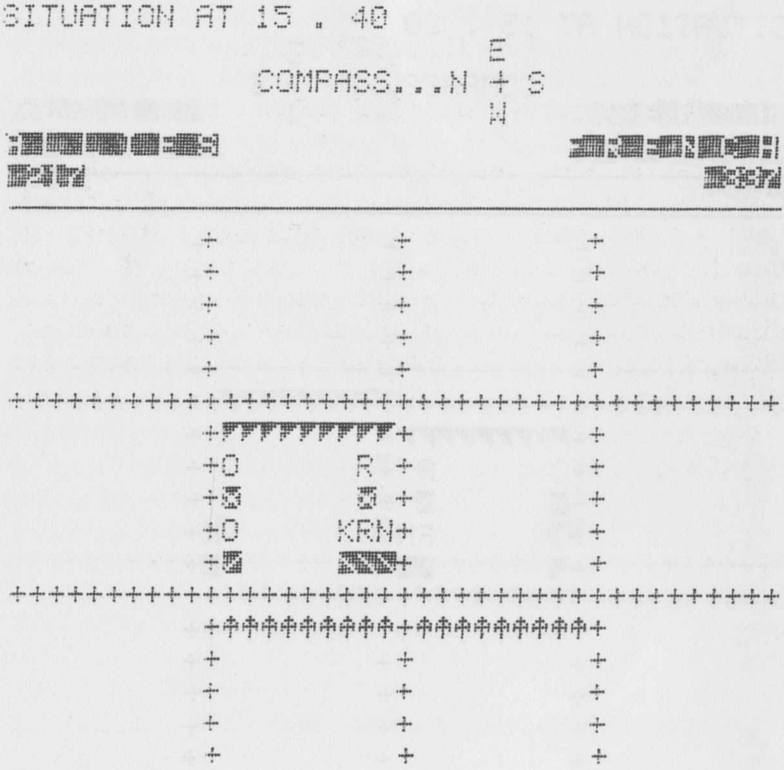
```
SITUATION AT 15 . 10
                       E
              COMPASS...N + S
```

On the battle map moves are calculated at ten-minute intervals rather than hourly. The pieces on the main map have been transferred to a larger scale map where only individual units on the same square will attack each other. Cavalry and infantry are also marked where applicable. Artillery at this point in the game has no bearing on casualties. Notice how the 'compass' point has changed to accommodate all the forces. Orange (O) and Reille (R) are on the town square of Quatre Bras. Reille moved in last, and so at the moment the advantage is with Orange who has 269 points to Reille's 149. The combat sign is marked with 'zigzag' graphics which shows the square under attack. This will obscure the 'closed dot' graphics of a town square. Ney and Kellermanm are one square away to the south. They will take no part in this action, but can come up one at a time over the following moves.



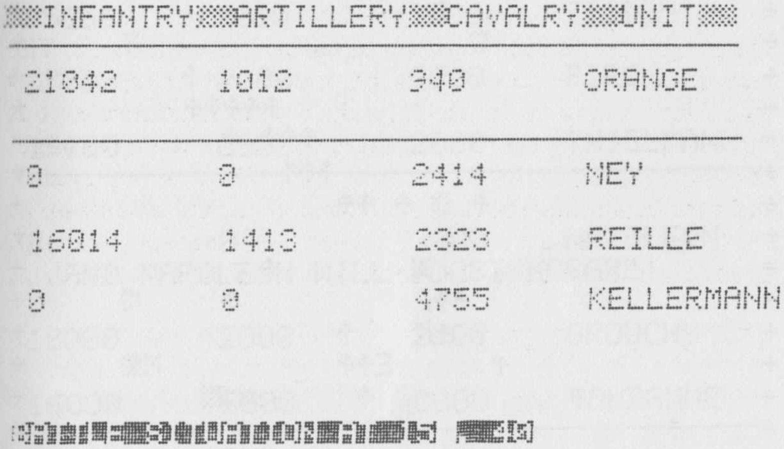
```
SITUATION AT 15 . 20
                                E
                  COMPASS...N + S
                                W
```

The orders are asked for as two characters – there is no need to press the 'return key'. As the last Allied move the British player typed 'O0'. The first keystroke applies to the unit. The second to the direction moved. So in this case Orange (O) stood still (0). The French player moved Ney to the north to join the action and so typed 'NN' – Ney, North. Now that Reille (R) is in the town square, the advantage which Orange (O) had in the last move (it's always an advantage to be in a town square) has vanished. The casualties have increased, and the points have changed. Now that Ney – being a 'leader' he has superior morale – has arrived, the points score has shifted to the French advantage. For the next move the British stay put ('O0' is typed again), and the French have moved Kellermann and his cavalry up to reinforce the attack ('KN' is typed – Kellermann, North). Orange will have to retreat soon or he will be decimated.



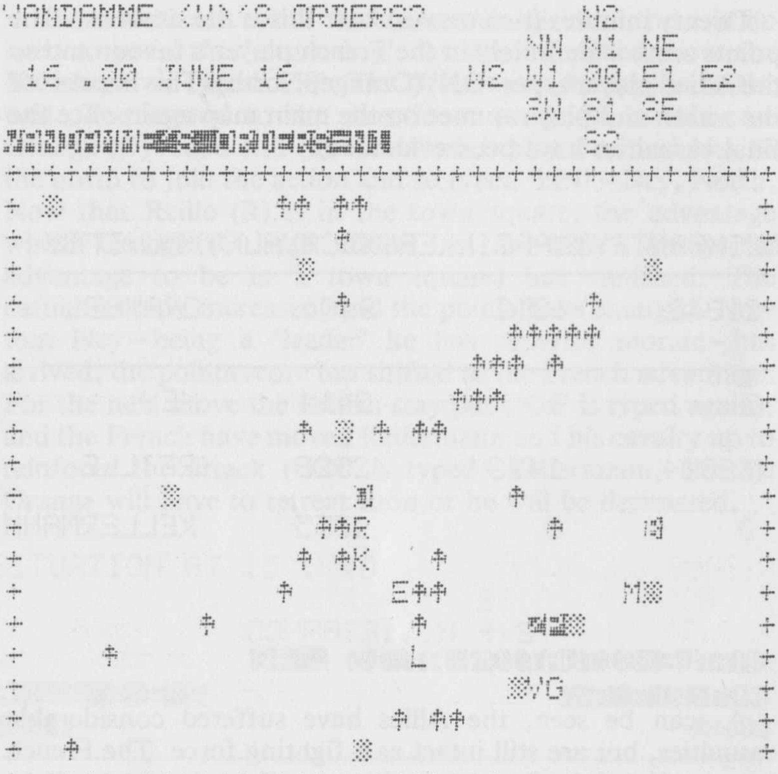
```
SITUATION AT 15 . 40
                        E
            COMPASS...N + S
                        W

----------------------------------------
          +         +         +
          +         +         +
          +         +         +
          +         +         +
          +         +         +
++++++++++++++++++++++++++++++++++++++++
          +▀▀▀▀▀▀▀▀▀+         +
          +O      R +         +
          +▒      ▒ +         +
          +O      KRN+        +
          +▒      ▒▒▒+        +
++++++++++++++++++++++++++++++++++++++++
          +‡‡‡‡‡‡‡‡‡+‡‡‡‡‡‡‡‡‡+
          +         +         +
          +         +         +
          +         +         +
          +         +         +
```

Twenty minutes (two moves) later this is the situation. The points score is definitely in the French player's favour and so the Allied player types 'ON' (Orange, North). This breaks off the action and play resumes on the main map again once the final casualties have been evaluated.



```
▒INFANTRY▒ARTILLERY▒CAVALRY▒UNIT▒
--------------------------------------------------
 21042     1012      340     ORANGE
--------------------------------------------------
 0         0         2414    NEY

 16014     1413      2323    REILLE
 0         0         4755    KELLERMANN



[illegible]
```

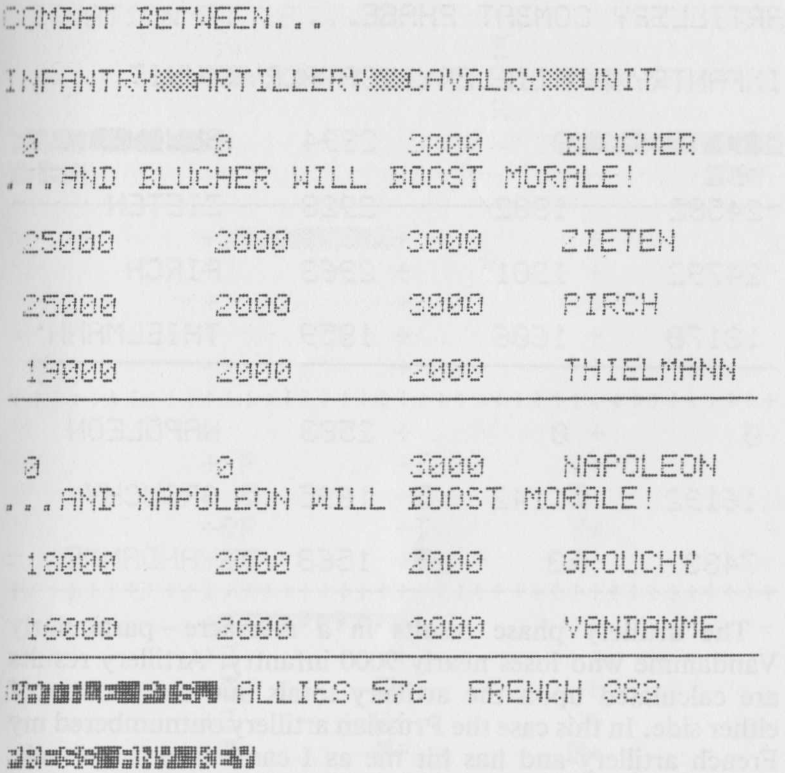
As can be seen, the Allies have suffered considerable casualties, but are still intact as a fighting force. The French have suffered badly too and are well under strength in infantry compared to the British unit. However, the Allied player has been forced to evacuate Quatre Bras which is not a disastrous blow as Orange is still alive and able to function. None of these units will be able to move next turn as they are still in a 'combat zone' and therefore still prepared to fight.



```
VANDAMME (V)'S ORDERS?                N2
                                   NW N1 NE
 16 .00 JUNE 16                 W2 W1 00 E1 E2
                                   SW S1 SE
                                      S2
```

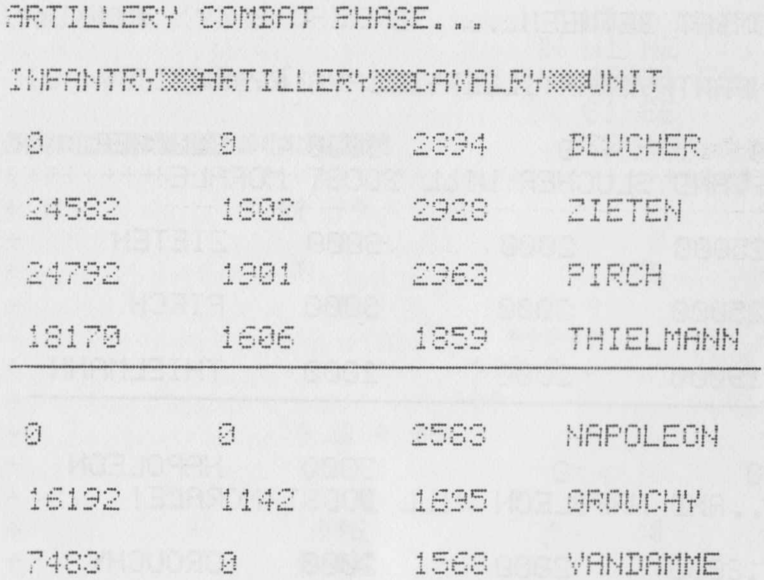
And in the next main move, you can see Orange (O) one square to the north of Reille (R) just as the battle map showed. Kellermann for some random reason has been ordered to fall back which means that the computer reckons the French haven't done as well as they would like to think!

But now it's the turn of the Prussians at Ligny. Vandamme (V) has just been ordered north together with all the other French units in the area, and hopefully, if they all obey their orders, I can wipe out the Prussians to the north of me. They are however pretty strong, and I may, by moving Lobau (L) and D'Erlon (E) to the west and not the east, now have too few forces on hand to defeat them completely! We shall see.



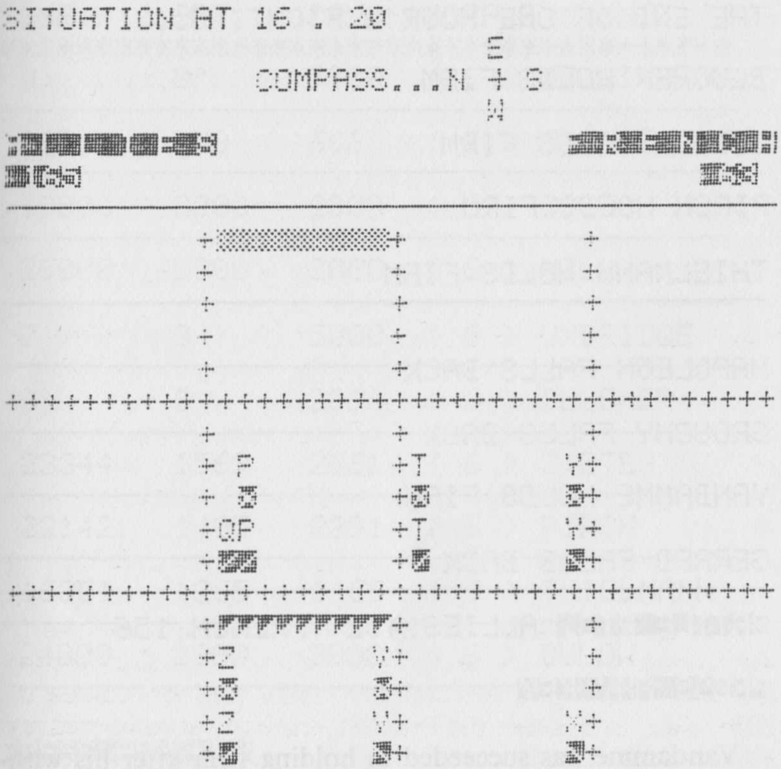
```
COMBAT BETWEEN...

INFANTRY▒ARTILLERY▒CAVALRY▒UNIT

 0          0          3000     BLUCHER
...AND BLUCHER WILL BOOST MORALE!

 25000      2000       3000     ZIETEN

 25000      2000       3000     PIRCH

 19000      2000       2000     THIELMANN
---------------------------------------------

 0          0          3000     NAPOLEON
...AND NAPOLEON WILL BOOST MORALE!

 18000      2000       2000     GROUCHY

 16000      2000       3000     VANDAMME
---------------------------------------------
[illegible] ALLIES 576  FRENCH 382

[illegible]
```

Disaster! Gérard (G) disobeyed his orders and went somewhere else. He hasn't turned up at my offensive. Even if he had, it is difficult to see how I could have defeated such a Prussian army. They have everyone there – not in a town, but quite strong enough to beat me anyway! Units do disobey orders occasionally: just as in real history, mistakes were made and orders mislaid or misunderstood. I will suffer a hammering here.



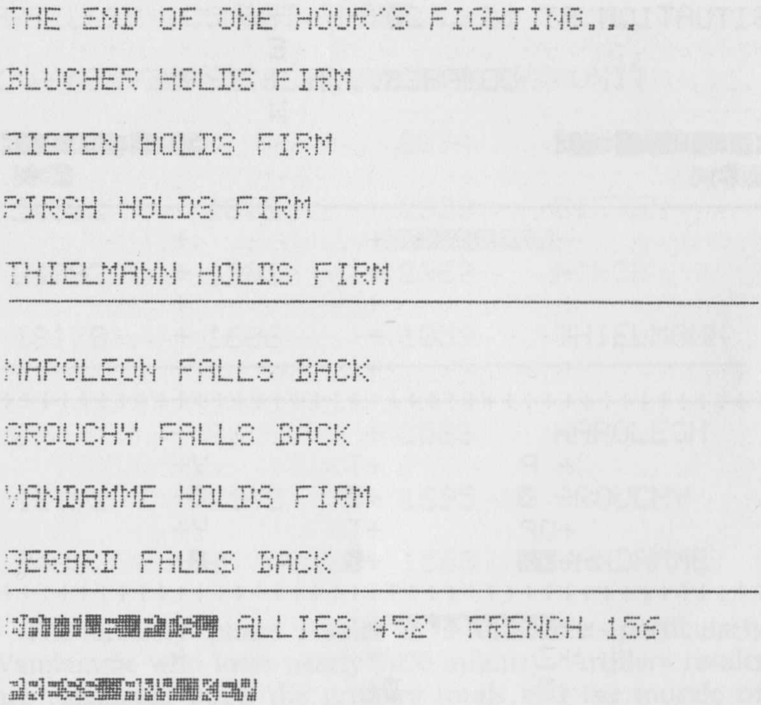
```
ARTILLERY COMBAT PHASE...

INFANTRY▒▒ARTILLERY▒▒CAVALRY▒▒UNIT

0           0        2894     BLUCHER

24582       1802     2928     ZIETEN

24792       1901     2963     PIRCH

18170       1606     1859     THIELMANN
-------------------------------------------

0           0        2583     NAPOLEON

16192       1142     1695     GROUCHY

7483        0        1568     VANDAMME
```

The artillery phase results in a massacre – particularly Vandamme who loses nearly 9000 infantry. Artillery results are calculated upon the artillery totals and the morale of either side. In this case the Prussian artillery outnumbered my French artillery and has hit me as I came into the attack. When we go to the battle map, I shall try and call off my attack.



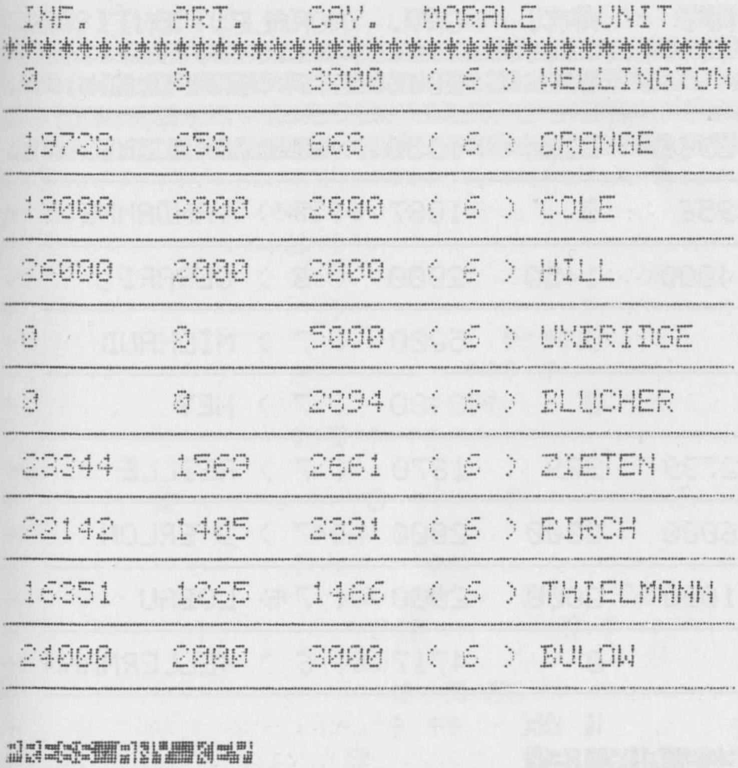
A slightly confused picture after two moves on the battle map (twenty minutes). Grouchy (Y) has withdrawn and been pursued by Thielmann (T) – the orders typed in were 'YS' and 'TS' (Grouchy, South and Thielmann, South). They will fight in a moment, but right now poor Vandamme (V) is being forced to take on the entire Zieten corps (Z) by itself. The points values show I will do badly out of all this.

After another twenty minutes, I succeed in withdrawing, and the computer then displays further information.



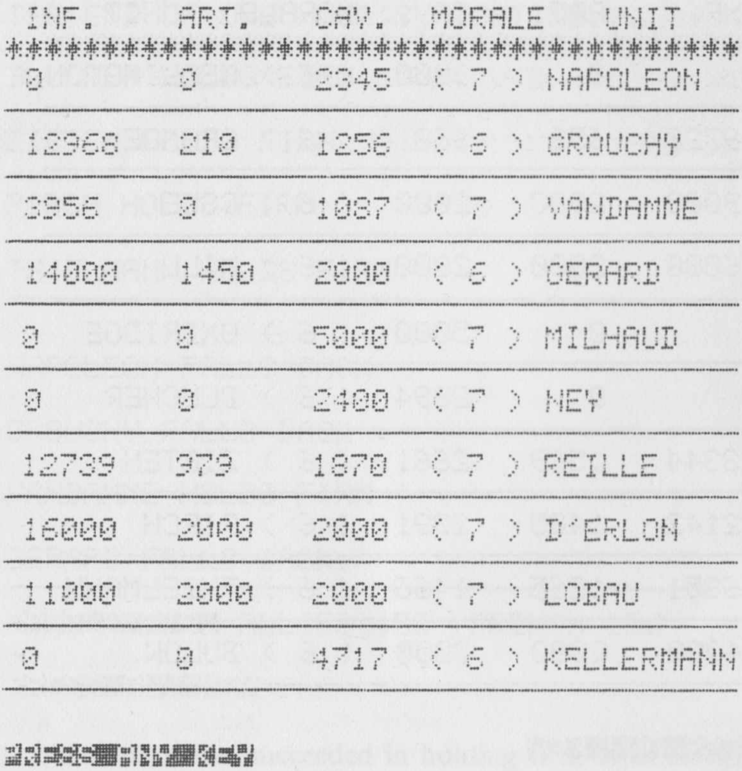
```
THE END OF ONE HOUR'S FIGHTING...

BLUCHER HOLDS FIRM

ZIETEN HOLDS FIRM

PIRCH HOLDS FIRM

THIELMANN HOLDS FIRM
------------------------------------------------------------

NAPOLEON FALLS BACK

GROUCHY FALLS BACK

VANDAMME HOLDS FIRM

GERARD FALLS BACK
------------------------------------------------------------
[illegible] ALLIES 452  FRENCH 156

[illegible]
```

Vandamme has succeeded in holding firm after his withdrawal, but the rest of the French units have been forced back further to the south owing to the general loss of points and of morale. Notice how Gérard (G), who was not present at the battle, has been caught up in the French retreat. We shall see the total casualties now.



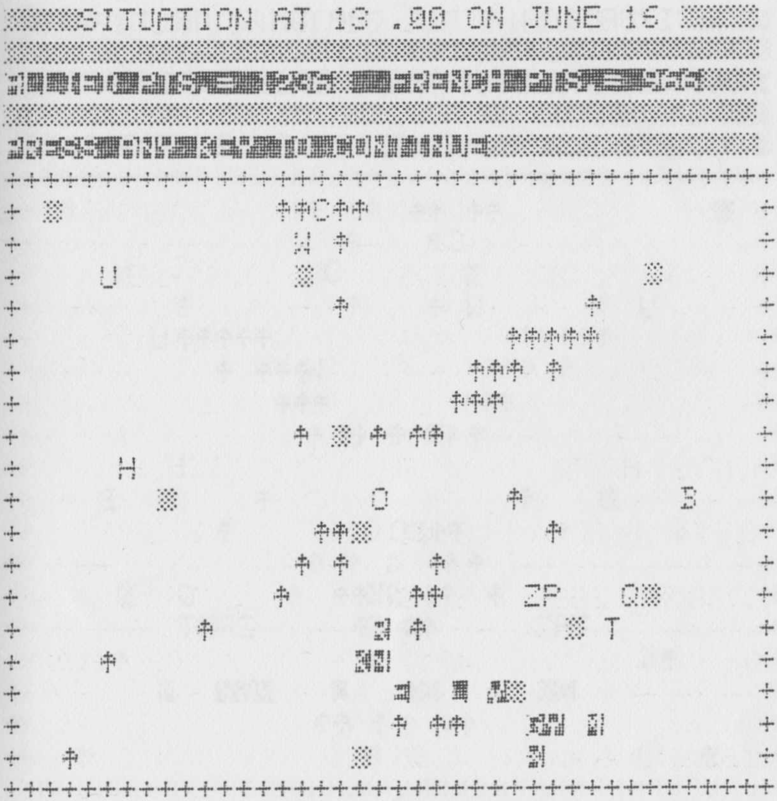
```
INF.    ART.    CAV.  MORALE  UNIT
*************************************
0       0       3000 ( 6 ) WELLINGTON
_____________________________________
19728   658     668  ( 6 ) ORANGE
_____________________________________
19000   2000    2000 ( 6 ) COLE
_____________________________________
26000   2000    2000 ( 6 ) HILL
_____________________________________
0       0       5000 ( 6 ) UXBRIDGE
_____________________________________
0       0       2894 ( 6 ) BLUCHER
_____________________________________
23344   1569    2661 ( 6 ) ZIETEN
_____________________________________
22142   1405    2391 ( 6 ) PIRCH
_____________________________________
16351   1265    1466 ( 6 ) THIELMANN
_____________________________________
24000   2000    3000 ( 6 ) BULOW
_____________________________________
```

The Allies have done well. Orange's unit has suffered a bit from its previous encounter, but is still a fighting force, while the Prussians have hardly suffered at all. Thielmann has lost 2500 infantry, and Zieten and Pirch have also suffered a few thousand casualties. The Allies' morale points are still unchanged. This is the best indication there is of an Allied victory.



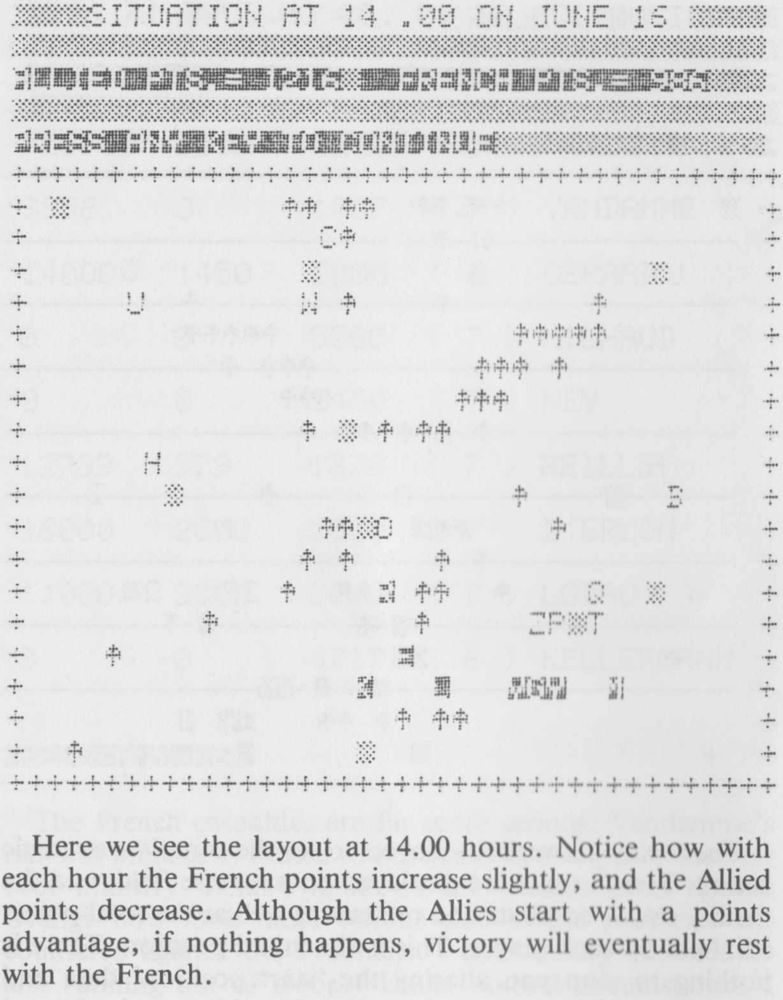
```
 INF.    ART.    CAV.  MORALE   UNIT
******************************************
 0       0       2345( 7 ) NAPOLEON
------------------------------------------
 12968   210     1256 ( 6 ) GROUCHY
------------------------------------------
 3956    0       1087 ( 7 ) VANDAMME
------------------------------------------
 14000   1450    2000 ( 6 ) GERARD
------------------------------------------
 0       0       5000( 7 ) MILHAUD
------------------------------------------
 0       0       2400( 7 ) NEY
------------------------------------------
 12739   979     1870( 7 ) REILLE
------------------------------------------
 16000   2000    2000 ( 7 ) D'ERLON
------------------------------------------
 11000   2000    2000 ( 7 ) LOBAU
------------------------------------------
 0       0       4717 ( 6 ) KELLERMANN
------------------------------------------
```

The French casualties are far more serious. Vandamme's unit has practically ceased to exist, and Grouchy has lost over 5000 infantry. Reille's losses on the western front against Orange now look more serious due to the problems encountered against the Prussians. I am running out of time and running out of troops! Under normal circumstances I could still hope to draw – or even win if my opponent makes a silly mistake – but I shall now press the relevant key for a replay and invite the Allied player to see where we both moved and where I went wrong. I accept his victory terms and pour a drink.



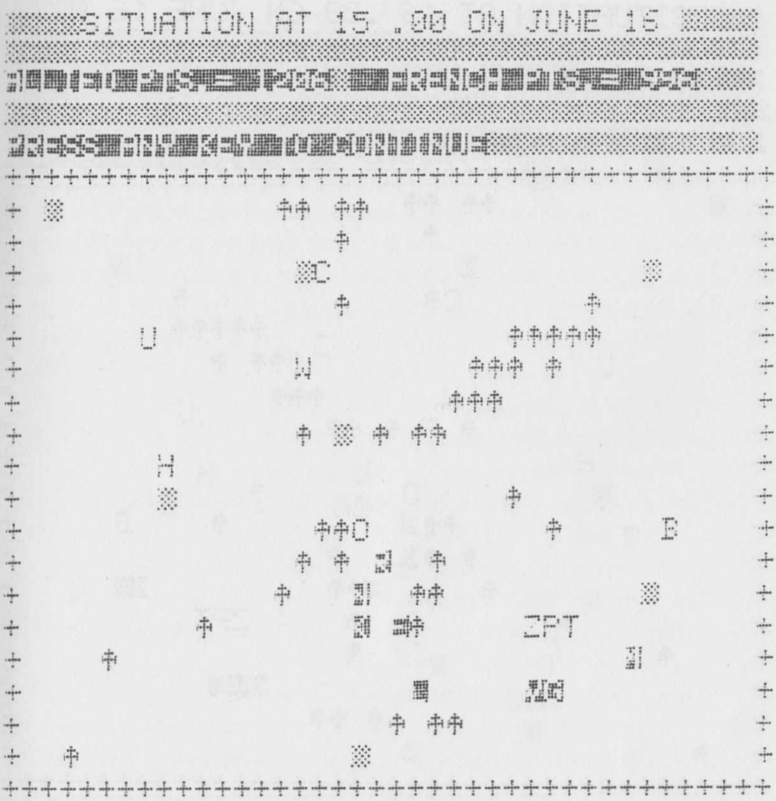
SITUATION AT 13.00 ON JUNE 16

The replay allows both players to see the complete strategic action. French units are displayed on a reverse field, and the facility shows combats and retreats as well as the total points still held by each player. This is the initial position. There is nothing to stop you altering the 'start position' data and launching off from somewhere else, but this was the factual starting point for all units at 13.00 hours on June 16th.



SITUATION AT 14 .00 ON JUNE 16

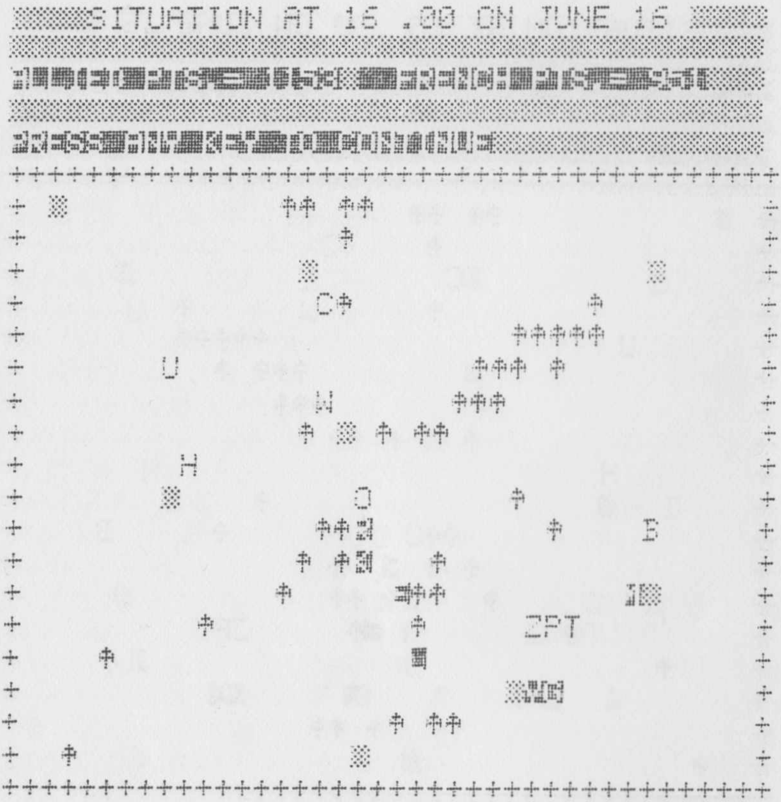
Here we see the layout at 14.00 hours. Notice how with each hour the French points increase slightly, and the Allied points decrease. Although the Allies start with a points advantage, if nothing happens, victory will eventually rest with the French.



SITUATION AT 15 .00 ON JUNE 16

From a tactical point of view, the French have not left enough forces to attack the Prussians. Notice also how far away the remaining British units are from the scene of action. Wellington, having only cavalry, moves twice as fast as Cole (C), but is still many hours away. All the French units round Ligny have stacked themselves under V and G.

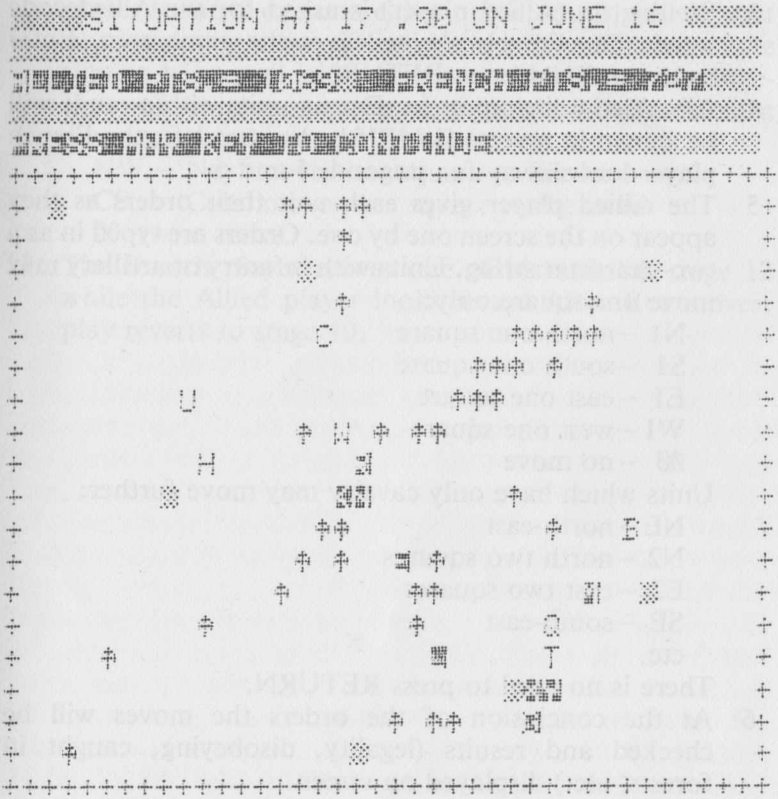
It was now that I ordered Ney, Kellermann and Reille to attack Orange.



SITUATION AT 16 .00 ON JUNE 16

The points score has been reduced now as a result of the casualties at Quatre Bras. Notice how Orange has been forced away to the north with Reille and the other French units in hot pursuit.

It was at this point that I ordered an all-out attack on the Prussians.



SITUATION AT 17.00 ON JUNE 16

The final frame on the display table. Gérard, who disobeyed my orders, went south, not north! Orange and Reille are on the same square, but Wellington is about to come in and help the Allies. The total points held by the French have been cut drastically as the losses at Ligny are accounted for. At this stage, the French would be hard pressed to win.

Better luck – or rather better tactics – next time!

Summary of commands and playing instructions

1 Allied player types in a secret code word. Press RETURN.
2 French player types in the code word. Press RETURN.

3. Wellington (Allied player) is asked for the Allied code word. The French player leaves the game area. Enter code word and press RETURN.
4. All Allied units report in. Enemy units within range will be shown in reverse field. If he has not left, the French player looks away for stages 4, 5 and 6.
5. The Allied player gives each unit their orders as they appear on the screen one by one. Orders are typed in as a two-character string. Units with infantry or artillery may move one square only:

   N1 – north one square
   S1 – south one square
   E1 – east one square
   W1 – west one square
   00 – no move

   Units which have only cavalry may move further:

   NE – north-east
   N2 – north two squares
   E2 – east two squares
   SE – south-east
   etc.

   There is no need to press RETURN.
6. At the conclusion of the orders the moves will be checked and results (legality, disobeying, caught in forests, etc.) displayed on screen.
7. The French player inputs his code word and presses RETURN: the Allied player looks away during stages 7, 8 and 9.
8. The French units report in (see 4).
9. The French player gives the orders (as 5).
10. Both players may now look at the screen as the moves and combat sequence begins. If there is no combat, play goes back to stage 3.
11. If there is limited combat, both players look at the screen and observe results.
12. If the combat phase goes to the battle map, both players watch the developments. During 'Allied orders', the French player looks away at each turn. Again the RETURN key is not used as each order is a two-character string. Each move of 'ten minutes' enables the Allied

player to move one unit either north, south, east or west or to make no move. This time, the first character is the unit to be moved and the second character is the direction of movement. Cavalry units have no extra movement at this stage. Example:

NW – 'Ney' moves one square to the west
CS – 'Cole' moves one square to the south
00 – no move

13 The French player moves one of his units as stage 12 while the Allied player looks away. After five moves, play reverts to stage 10.

Caractacus

An ancient war-game between two players

This is a very simple game which uses the ancient principle of all war-gaming, namely 'total confusion'! It is obviously not a simulation of a real combat, and the names of both armies should be changed to suit your needs. I have put in 'Britons' and 'Romans' but it could always be altered to 'Vikings' and 'Goths' or 'Persians' and 'Gauls'. The game starts with the basic rules and then displays the relative strengths of each side. If you are not happy with these, press 'N', and a new set will be randomly chosen.

Both armies have the same number of troops armed with swords or bows and arrows and the same initial set-up. The forces are divided into six regiments, and the orders that each side gives to each of these six regiments apply to all the soldiers in the regiment. This means that, after a suitable period of battle, the soldiers will become so completely intermingled that orders become very confusing. Once again, as in Waterloo, each player inputs his orders in private, and both then look at the results of their actions. The pace of the game is quite slow, but I find this more effective and more fun as people get 'gobbled up'. Each letter on the map is an individual soldier and the six regiments are detailed as follows:

ABCDEF	The centre
GHIJK	The left
LMNOP	The right
QRST	The reserve (which frequently gets in the way of retreating troops)
UVW	Far left and with the extra advantage of being armed with bows
XYZ	Far right – similarly armed as archers

Forces UVWXYZ are very useful, but can unfortunately fire into their own ranks and kill a few friendly soldiers. The screen becomes a very confused battleground after a bit!

When you are asked for the archers' orders you will be asked not just where you want them to move to (N, NE, E, SE, S, SW, W, NW or OK for no move), but also in which direction you would like them to aim their bows! The maximum range for an arrow is five squares, and they will – as I've already warned you – obey their orders implicitly!

Once all the regiments have received their orders, half an hour of fighting takes place. You will see the soldiers march in the direction you ordered and fight any enemy in their path. If they win, the enemy soldier is forced back and loses a 'strength point'. If the losing soldier cannot retreat, then he is eliminated. He is similarly lost if he is pushed off the board or if his strength falls below 1 and he becomes too weak to stand up! The choice of which soldier moves at each turn is an entirely random one, and so you may well find one soldier moving several times while others only move occasionally. Some may not move at all – that's where the luck and confusion come in. The fighting is calculated as a random factor dependant on the individual's 'strength point'.

This is not a 'serious' war-game. It does however use the computer's random generator to build up a genuine muddle of the 'fog of war'. When both sides have become too mixed up, you will be given the chance to realign yourselves in the same order as you both had in the beginning.

Very few victories have been achieved in this game. What tends to happen is that everyone gets lost somewhere near the outer edges of the board, and the survivors – by this time few in number – never really fight each other again unless you realign your formations. The points for each side are an accumulation of the total 'strength points' from all your soldiers. To win, you will need luck and a fair bit of judgement as to what your opponent has just ordered the other troops to do.

Don't get trapped without places for your soldiers to retreat to.

The program

Don't get trapped without places for your soldiers to retreat to.

Breakdown of listing

Lines	
11–31	Dimension of arrays and rules display
32–47	Strength point calculation
50–65	Initial starting position data
90–215	Set up both forces on the map
220–299	Input of orders for each player in turn for each regiment
300–510	Calculation and display of moves and combat
511–578	End of half an hour in real time. Option to realign. Victory?
600–710	Independent random subroutines
800–840	Moves interpretation and checks
900–918	Archery display
920–935	Removal of lost unit from map

I have written this program in quite a simplistic way with no real account taken of memory saving. By squeezing up some of the lines and placing a simple input order subroutine from lines 220 to 299, you will be able to make it a lot shorter. However it may be easier to understand it from the way that I display it here.

The main variables used in the program are:

D(2,26)	Letter to mark the soldier on the map
P(2,26)	Position of each soldier on the map
S(2,26)	Strength point of each soldier (random at start)
M(2,26)	Move addition to move soldier's location on the screen
BB	British total points
RR	Roman total points

CARACTACUS

```
0 REM WALWYN
1 REM CARACTACUS
10 GOSUB63900
12 DIM M(2,26),S(2,26),P(2,26),D(2,26)
15 X=-120:T=0
16 UC=UC+124
18 H=US+164
20 G=US+124
22 DIM F(2,2)
23 POKEUG,UF
24 PRINTU7$;"█*****CARACTACUS*****(C)WALWYN******"
25 PRINTU9$;"███THIS IS A TWO PERSON WAR GAME
26 PRINT"█BETWEEN ANCIENT BRITONS AND ROMANS
27 FORA=1TO2000:NEXT A
28 PRINT"█WHEN YOU ARE ASKED FOR ORDERS,
29 PRINT"█INPUT DIRECTION AS POINTS ON A COMPASS
30 PRINT"█(NORTH=N,SOUTH-EAST=SE, ETC. NO MOVE=OK)
31 PRINTU7$;"█████THE ROMANS ARE PRINTED IN REVERSE FIELD":FORA=1TO3000:NEXT A
32 RR=0:BB=0
35 FOR A=1 TO 2
36 FOR I=1TO26
37 GOSUB 700
```

```
38 S(A,I)=Q
39 NEXT I:NEXT A
40 FOR I=1 TO 26
41 BB=BB+S(1,I):RR=RR+S(2,I):NEXT I
42 PRINTU1$;"⌴THE POINTS VALUES ARE AS FOLLOWS:
43 PRINTU7$;"██ROMANS..."RR
44 PRINTU9$;"██BRITONS.."BB
45 PRINTU1$;"███ARE YOU HAPPY WITH THIS? (Y/N)
46 GET W$:IF W$=""GOTO46
47 IF W$="N"THEN PRINT"██OK-WAIT ":GOTO32
50 FOR I=1 TO 26
51 D(1,I)=I:D(2,I)=I+128
52 NEXT I
53 FOR A=1 TO 2
54 FOR I=1 TO 26
56 READ P(A,I)
58 NEXT I
59 NEXT A
60 DATA 453,413,412,493,492,452,333,293,253,252,292,573,613,653,652,612
61 DATA 449,409,489,448,91,131,171,811,771,731
62 DATA 455,415,416,495,496,456,575,615,655,656,616,335,295,255,256,296
63 DATA 459,419,499,460,817,777,737,97,137,177
65 RESTORE
90 POKEUG,U3:PRINT"⌴":POKEUG,U6
```

```
100 FOR I=0 TO 28
110 POKE H+I,43
120 POKE H+800+I,43
130 NEXT I
140 FOR I=0 TO 20
150 POKE H+I*40,43
160 POKE H+28+I*40,43
170 NEXT I
200 FOR I=1 TO 26
202 IF S(1,I)<=0 THEN P(1,I)=X:GOTO207
205 POKE G+P(1,I),D(1,I):POKEUC+P(1,I),U9
207 IF S(2,I)<=0 THEN P(2,I)=X:GOTO215
210 POKE G+P(2,I),D(2,I):POKEUC+P(2,I),U7
215 NEXT I
220 FORA=1 TO 2
221 FOR J=1 TO 8
222 NA$(1)=U9$+"BRITONS":NA$(2)=U7$+"ROMANS"
224 PRINT"█"NA$(A)" ORDERS                          "
227 PRINT"█
229 ON J GOTO 230,240,250,260,270,276,280,286
230 INPUT"□CENTRE   (ABCDEF)";N$
231 GOSUB 800
232 FOR I=1 TO 6
233 M(A,I)=N
```

```
234 NEXT I
235 NEXT J
240 INPUT "□LEFT   (GHIJK)";N$
241 GOSUB 800
242 FOR I=7 TO 11
243 M(A,I)=N
244 NEXT I
245 NEXT J
250 INPUT"□RIGHT   (LMNOP)";N$
251 GOSUB 800
252 FOR I=12 TO 16
253 M(A,I)=N
254 NEXT I
255 NEXT J
260 INPUT"□RESERVE   (QRST)";N$
261 GOSUB 800
262 FOR I= 17 TO 20
263 M(A,I)=N
264 NEXT I
265 NEXT J
270 INPUT"□ARCHERY-LEFT   (UVW)";N$
271 GOSUB 800
272 FOR I=21 TO 23
273 M(A,I)=N
274 NEXT I
275 NEXT J
276 INPUT"□DIRECTION OF FIRE ";N$
277 GOSUB 800
278 F(A,1)=N
279 NEXT J
280 INPUT"□ARCHERY-RIGHT   (XYZ)";N$
281 GOSUB 800
282 FOR I =24 TO 26
283 M(A,I)=N
284 NEXT I
285 NEXT J
286 INPUT"□DIRECTION OF FIRE ";N$
287 GOSUB 800
288 F(A,2)=N
289 NEXT J
290 PRINT"■                "
297 NEXT A
299 PRINT"■                    "
300 FOR C=1 TO30
310 FOR B=1TO2
312 BB=0:RR=0
320 GOSUB 600
323 IF S(B,Q)<=0 THEN GOTO 320
```

```
325 POKEUC+P(B,Q),U1
330 IF B=1 THEN E=2
335 IF B=2 THEN E=1
337 IFPEEK(G+P(B,Q)+M(B,Q))=43THEN490
340 FOR A=1TO 26
345 IF P(B,Q)+M(B,Q)=P(B,A) GOTO490
360 IF P(B,Q)+M(B,Q)=P(E,A) GOTO370
365 NEXT A
366 GOTO480
370 GOSUB 650
372 POKEG+P(B,Q),32
375 IF(S(B,Q)+R)>=(S(E,A)+V)GOTO420
385 S(B,Q)=S(B,Q)-1
390 S(E,A)=S(E,A)+1
395 IF S(B,Q)=0 THEN P(B,Q)=X
400 IF S(E,A)>9 THEN S(E,A)=9
405 M(B,Q)=0
410 GOTO480
420 S(B,Q)=S(B,Q)+1
425 S(E,A)=S(E,A)-1
426 IF E=1 THEN P(E,A)=P(E,A)-1
427 IF E=2 THEN P(E,A)=P(E,A)+1
430 IF S(E,A)=0 THEN P(E,A)=X
435 POKE G+P(B,Q),32:POKEUC+P(B,Q),U3
```

```
440 IF S(B,Q)>9 THEN S(B,Q)=9
455 FOR Y=1TO26
457 IF A=Y GOTO 463
460 IF P(E,A)<>P(E,Y) AND P(E,A)<>P(B,Y)GOTO463
461 S(E,A)=0:P(E,A)=X
462 GOTO475
463 NEXT Y
475 POKE G+ P(E,A),D(E,A):POKEUC+P(E,A),18-4*E
480 POKEG+P(B,Q),32:P(B,Q)=P(B,Q)+M(B,Q)
482 IF P(B,Q)<30 THEN P(B,Q)=X:S(B,Q)=0
483 IF P(B,Q)>830 THEN P(B,Q)=X:S(B,Q)=0
490 POKE G+ P(B,Q),D(B,Q):POKEUC+P(B,Q),18-4*B
492 IF Q>20THEN GOSUB900
495 NEXT B
496 FORA=1TO26
497 RR=RR+S(2,A):BB=BB+S(1,A)
498 NEXT A
499 PRINTUE$;"■■■■■...DEAD"
500 PRINT"■                                                        "
501 PRINTU8$;"□POINTS..."U7$;"R:"RR;U9$;"B:"BB;UR$;"     MINUTES:"C:PRINTU8$;
510 NEXT C
511 T=T+1
515 PRINTUE$;"■***END OF HALF AN HOUR'S FIGHTING***"
516 FORA=1TO5:FORJ=1TO100:POKEUG,UU:NEXTJ:POKEUG,U6:FORJ=1TO100:NEXTJ:NEXTA
```

Bko 808 137

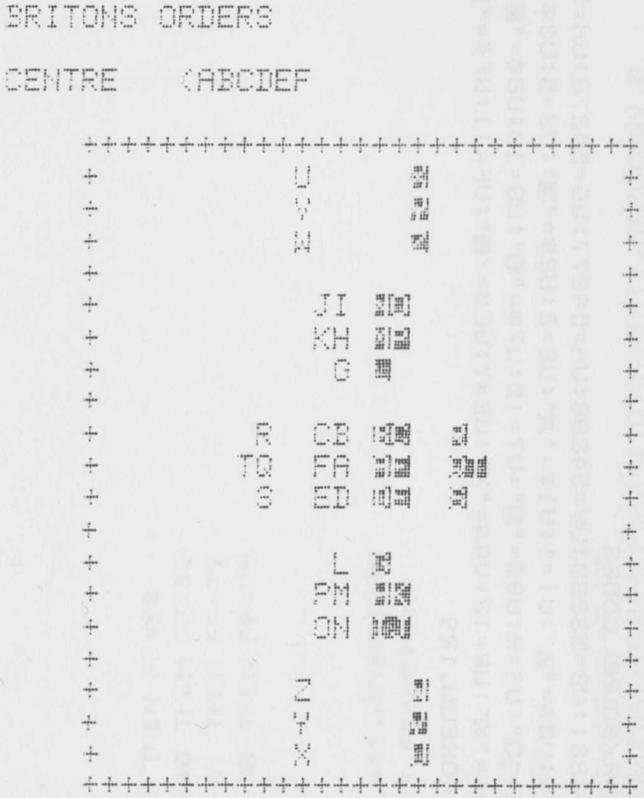
```
520 FOR A=1TO 3500:NEXT A:PRINTU1$;
521 IF BB=>3*RR/2 THEN PRINT"█A ROMAN DEFEAT!- GOOD WORK BOADICEA!":END
522 IF RR=>3*BB/2 THEN PRINT"█ROMAN VICTORY!-BRITAIN UNDER ROMAN RULE!":END
524 IF T>=3THEN PRINT"█*ITS GETTING LATE & EVERYONE'S TIRED!*":GOTO550
525 GOTO90
550 FOR A=1 TO 3000:NEXT A
552 PRINT"█DO YOU WANT TO CONTINUE? (Y/N)"
555 INPUT N$
557 IF N$="Y" THEN 570
559 PRINTU7$;"███ROME HAS "RR"TROOPS LEFT
560 PRINTU9$;"█BRITAIN HAS "BB:PRINTU8$;
562 IF BB>RR THEN PRINT"██WHICH MAKES IT A NARROW BRITISH VICTORY!":END
564 IF RR>BB THEN PRINT"██WHICH MEANS THAT CAESAR HAS JUST WON":END
566 PRINT"██A DRAW!- MOST UNUSUAL!":END
570 PRINT"█DO YOU BOTH WANT TO REORGANISE
572 PRINT"██YOUR TIRED FORCES ? (Y/N)"
574 INPUT"██";N$
576 IF N$="N" THEN 90
578 GOTO 53
600 Q=RND(1)*26+1
610 Q=INT(Q)
620 RETURN
650 FOR Z=1TO10:POKEUV,15:POKEUW,33:POKEUH,INT(RND(1)*20+2)
675 POKE G+P(B,Q),102
```

```
680 POKE G+P(E,A),102
685 POKE G+P(B,Q),D(B,Q)
690 POKE G+P(E,A),D(E,A)
691 NEXTZ:POKEUV,0:POKEUW,129
692 R=RND(1)*4+1
693 V=RND(1)*4+1
694 R=INT(R)
695 V=INT(V)
696 RETURN
700 Q=RND(1)*4+2
705 Q=INT(Q)
710 RETURN
800 IF N$="NE" THEN N=-39:RETURN
805 IF N$="NW" THEN N=-41:RETURN
810 IF N$="SE" THEN N=41:RETURN
815 IF N$="SW" THEN N=39:RETURN
818 IF N$="OK" THEN N=0:RETURN
820 IF N$="E" THEN N=1:RETURN
825 IF N$="W" THEN N=-1:RETURN
830 IF N$="N" THEN N=-40:RETURN
835 IF N$="S" THEN N=40:RETURN
836 N=0
837 PRINT"█***THERE'S NO SUCH ORDER!***
838 FOR Y=1 TO 2000:NEXT Y
```

```
839 PRINT"▣                       "
840 RETURN
900 M=1
901 IF Q>23 THEN M=2
902 IF F(B,M)=1 OR F(B,M)=-1 THEN FF=64
903 IF F(B,M)=40 OR F(B,M)=-40 THEN FF=93
904 IF F(B,M)=41 OR F(B,M)=-41 THEN FF=77
905 IF F(B,M)=39 OR F(B,M)=-39 THEN FF=78
906 IF F(B,M)=0 THEN RETURN
907 FOR A=1TO 5
908 F=A*F(B,M)
909 KL=PEEK(G+P(B,Q)+F):IFKL=43THENRETURN
910 IFKL=32THENPOKEG+P(B,Q)+F,FF:GOTO916
911 POKEUV,15:POKEUW,33
912 FOR I=1 TO26:POKEUH,200-I
913 IF P(B,I)=P(B,Q)+F GOTO920
914 IF P(E,I)=P(B,Q)+F GOTO930
915 NEXT I
916 POKE G+P(B,Q)+F,32:POKEUC+P(B,Q)+F,U3
917 POKEUV,15:POKEUL,250-A*48:POKEUH,244:FORZ=1TO10:NEXTZ,A:POKEUV,0
918 RETURN
920 POKE G+P(B,I),32:POKEUC+P(B,I),U3
922 S(B,I)=0:P(B,I)=X
923 POKE G+P(B,I),D(B,I):POKEUC+P(B,I),18-4*B
```

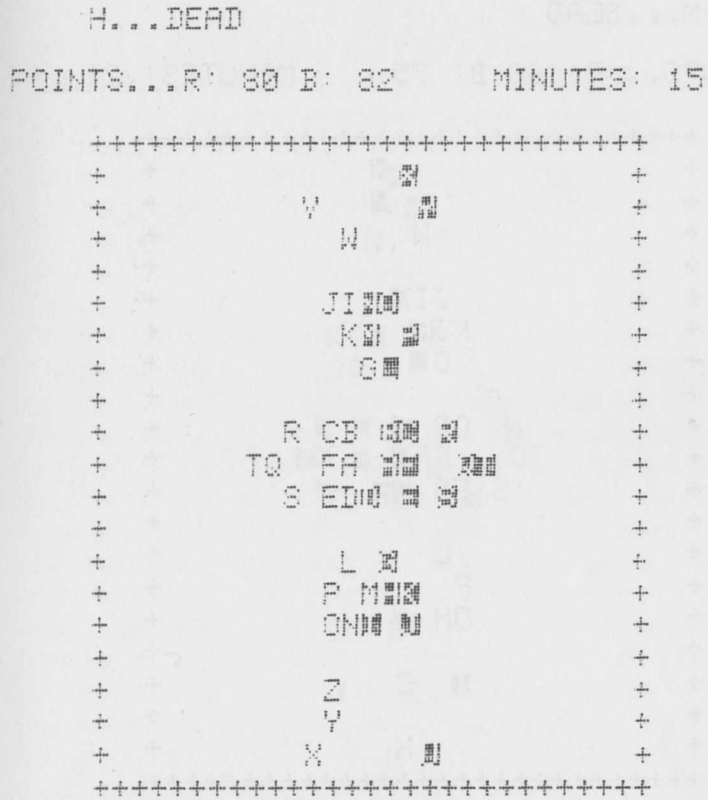
```
925 POKEUV,0:POKEUW,129:RETURN
930 POKE G+P(E,I),32:POKEUC+P(E,I),U3
932 S(E,I)=0:P(E,I)=X
933 POKE G+P(E,I),D(E,I):POKEUC+P(E,I),18-4*E
935 POKEUV,0:POKEUW,129:RETURN
63900 REM COMMODORE 64 COLOUR/SOUND CODES
63902 US=1024:UC=55296:UG=53281:UB=53280:UV=54296:UA=54277:UD=54278:UH=54273
63905 UL=54272:UW=54276:U0=0:U0$="■":U1=1:U1$="▣":U2=2:U2$="▣":U3=5:U3$="▣"
63910 U4=6:U4$="▣":U5=8:U5$="▣":U6=9:U6$="▣":U7=10:U7$="▣":U8=13:U8$="■"
63915 U9=14:U9$="▣":UU=4:UU$="▓":UR=12:UR$="▣":UE=7:UE$="▣":UF=11:UF$="▣"
63920 POKEUA,55:POKEUD,100:POKEUW,129
63930 RETURN

READY.
```

Examples of play



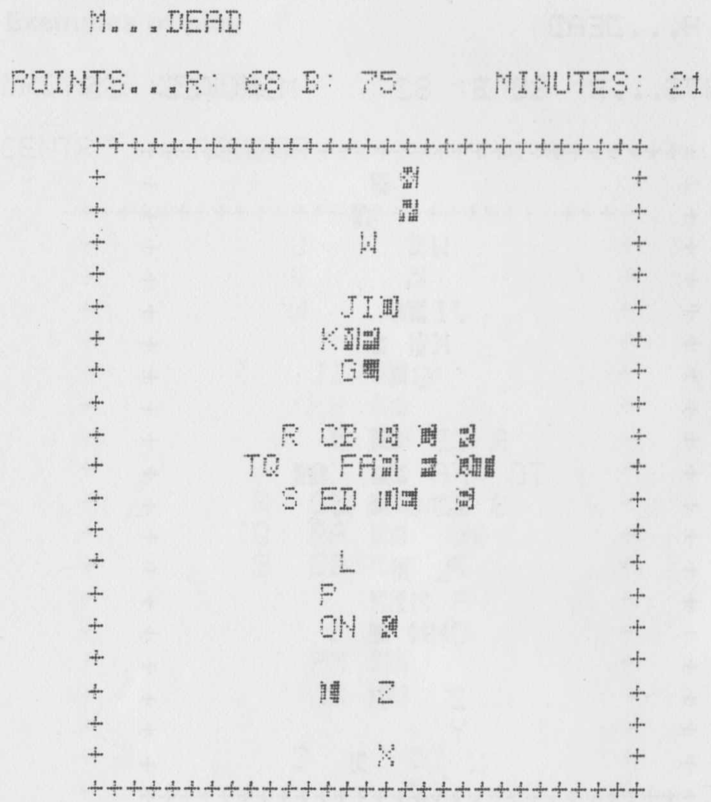
```
BRITONS ORDERS

CENTRE   <ABCDEF

       ++++++++++++++++++++++++++++++
       +          U      ▨          +
       +          V      ▨          +
       +          W      ▨          +
       +                            +
       +           JI ▨▨            +
       +           KH ▨▨            +
       +            G ▨             +
       +                            +
       +        R  CB ▨▨   ▨        +
       +       TQ  FA ▨▨  ▨▨▨       +
       +        S  ED ▨▨   ▨        +
       +                            +
       +            L ▨             +
       +           PM ▨▨            +
       +           ON ▨▨            +
       +                            +
       +          Z      ▨          +
       +          Y      ▨          +
       +          X      ▨          +
       ++++++++++++++++++++++++++++++
```

The initial position of all forces. The Romans are printed in reverse field and 'play' – so to speak – from right to left. The screen is asking for the British (or rather Britons') movement orders for the centre regiment which include all soldiers ABCDEF. I have moved them to the east to attack the Romans by typing an 'E' and then the 'RETURN' key.



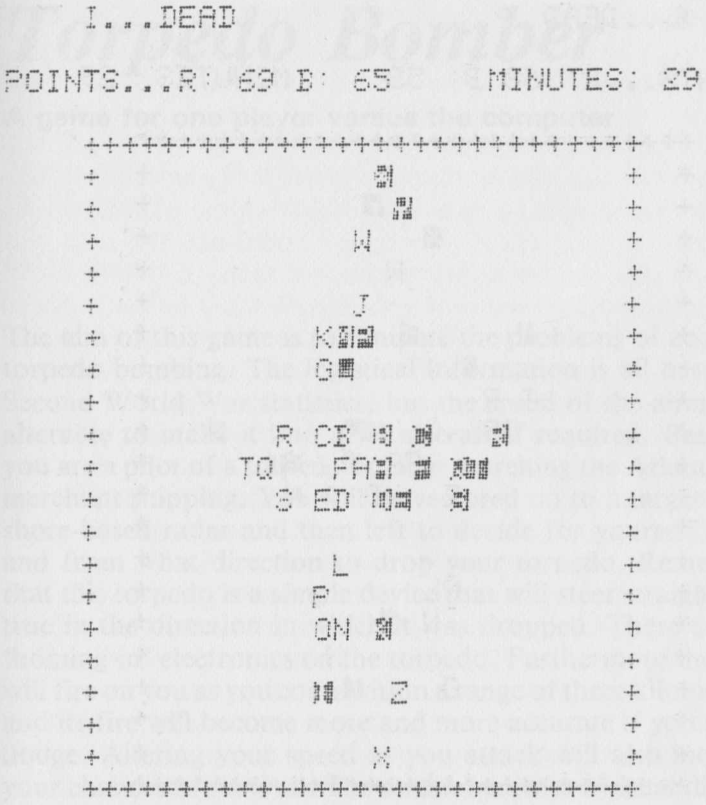
```
 H...DEAD

POINTS...R: 80 B: 82    MINUTES: 15

    +++++++++++++++++++++++++++++
    +               ▓           +
    +          V     ▓          +
    +            W              +
    +                           +
    +           JI▓▓            +
    +            K▓ ▓           +
    +             G▓            +
    +                           +
    +         R CB ▓▓ ▓         +
    +       TQ  FA ▓▓  ▓▓       +
    +         S ED▓ ▓ ▓         +
    +                           +
    +            L ▓            +
    +           P M▓▓           +
    +           ON▓ ▓           +
    +                           +
    +           Z               +
    +           Y               +
    +          X     ▓          +
    +++++++++++++++++++++++++++++
```

After fifteen minutes of ‘game time’ (in real time only about forty-five seconds) the situation is already getting a bit out of hand. I seem to have succeeded in killing off most of the Roman archers on the Britons’ right wing, but there is a fierce battle going on in the centre.



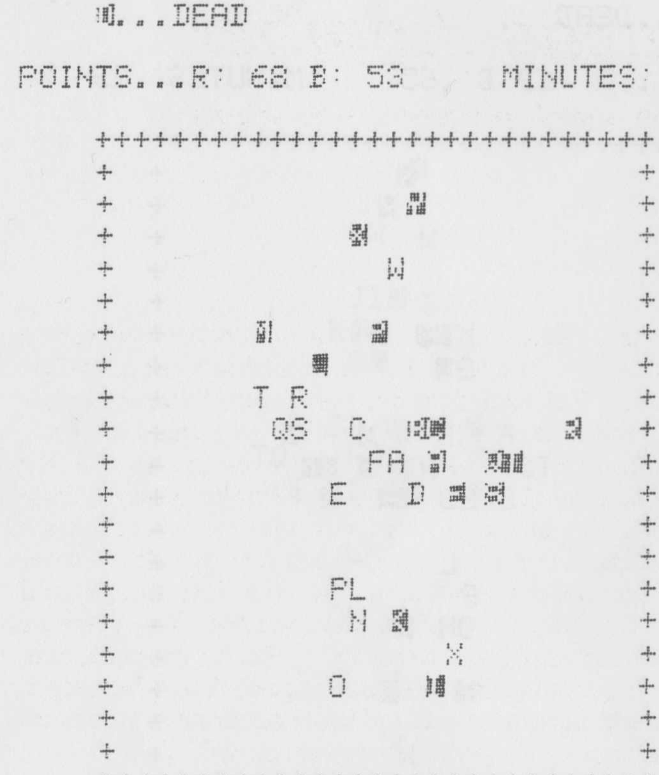
```
    M...DEAD

POINTS...R: 68 B: 75     MINUTES: 21

    +++++++++++++++++++++++++++++
    +               ▒           +
    +               ▒           +
    +             W             +
    +                           +
    +            JI▒            +
    +           K▒▒             +
    +            G▒             +
    +                           +
    +         R CB ▒ ▒ ▒        +
    +       TQ   FA▒ ▒ ▒▒       +
    +         S ED ▒▒  ▒        +
    +                           +
    +            L              +
    +           P               +
    +           ON ▒            +
    +                           +
    +           ▒  Z            +
    +                           +
    +              X            +
    +++++++++++++++++++++++++++++
```

Twenty-one minutes gone, and my victorious archers have decimated the enemy's entire left wing. My own left wing looks as if it might get into trouble later. The points are growing steadily in my favour.



```
    I...DEAD

POINTS...R: 69 B: 65   MINUTES: 29
    +++++++++++++++++++++++++++++
    +              ▦            +
    +             ▦▦            +
    +             W             +
    +                           +
    +             J             +
    +           K▦▦             +
    +           G▦              +
    +                           +
    +         R CB ▦ ▦   ▦      +
    +       TQ  FA▦ ▦ ▦▦        +
    +         S ED▦▦  ▦         +
    +                           +
    +            L              +
    +           P               +
    +           ON ▦            +
    +                           +
    +           ▦   Z           +
    +                           +
    +              X            +
    +++++++++++++++++++++++++++++
```

At the end of the first game-time move of thirty minutes, I have lost some considerable strength in the centre, but am still poised to move my right wing into the attack and squeeze the Roman centre from two sides. Now both players have an opportunity to rewrite their orders.



```
     █..DEAD

POINTS...R: 68 B: 53     MINUTES: 29

     ++++++++++++++++++++++++++++++
     +                            +
     +               █            +
     +            █               +
     +              W             +
     +                            +
     +       █     █              +
     +          █                 +
     +       T R                  +
     +        QS  C   ██      █   +
     +             FA █  ██       +
     +           E   D █ █        +
     +                            +
     +                            +
     +           PL               +
     +            N █             +
     +                 X          +
     +           O    █           +
     +                            +
     +                            +
     ++++++++++++++++++++++++++++++
```

Another half an hour has passed and, although it doesn't look as though much has happened, my right wing has not succeeded in doing anything constructive. This is of course bad luck, but since I programmed the game, my opponent doesn't have much sympathy! My left and centre are being slaughtered by the enemy's advancing fight wing, and it is now my forces that are getting squeezed! The enemy is about to order the reserve in to attack my centre. My points score is falling, and I can do nothing about it. I surrender, but with honour.

Torpedo Bomber

A game for one player versus the computer

The aim of this game is to simulate the problems of accurate torpedo bombing. The logistical information is all based on Second World War statistics, but the speed of the aircraft is alterable to make it into a jet aircraft if required. Basically you are a pilot of a torpedo bomber searching the Atlantic for merchant shipping. You will be vectored on to a target from shore-based radar and then left to decide for yourself when and from what direction to drop your torpedo. Remember that this torpedo is a simple device that will steer straight and true in the direction in which it was dropped. There are no 'homing-in' electronics on the torpedo. Furthermore the ship will fire on you as you come within a range of three kilometres, and its fire will become more and more accurate if you don't dodge. Altering your speed as you attack will also increase your chances of survival. The screen becomes a visual display of what can be seen through your windscreen, and a small picture of your aircraft at the bottom of the screen shows how accurate the defensive firepower is becoming.

The instructions for play are included in the program.

How to play and win

On running the program, you will see your current speed at the top left of the screen, your current compass heading and your points score to date at the top right. You will also see 'SEARCHING FOR TARGET' which is self-explanatory. The empty sea out of the screen shows you nothing is in sight yet. After a few seconds you will see a target instruction with the compass bearing and range of the target. You can either steer this compass course or use it to work out the best attacking position and then manoeuvre your aircraft accordingly. For example, do you wish to attack head on, beam on or at an angle from the stern?

Once you are within twelve kilometres of the target, the ship will become visible. The further 'up' the screen it is, the further it is away from you. The ship's aspect will change as you steer around it. If you drop a torpedo, the ship will perhaps alter course to try and avoid being hit. The ship's own course (the direction it is steering in) will be given in the second row on the screen by the letter D. Normally this is due east (90), but it may alter depending on what action you take. When you drop the torpedo, the torpedo information, such as its number and the distance from the torpedo to target, will be added to the screen. The further away from the ship you drop your torpedo, the greater your points value if you sink her. If you do succeed in hitting your target (a lot more difficult than you may think), turn round to have a look, and you will be rewarded by the sight of the ship going down! The word 'TARGET' will disappear from the screen and be substituted by the word 'WRECK'! You may then have another go and try to build up your score.

All the calculations used in this program are in 'real time'. The positions of the ship, the torpedo and your aircraft are all independent of each other, and you will have to think fast when attacking. Once you have dropped your torpedo, get out of the way as quickly as you can!

The program

Breakdown of listing

Lines	
5–85	Load of data and initial set up
90–116	Screen display
120–190	Key pressed transfer
200–240	Target ship movement calculation
300–340	Torpedo movement calculation
400–470	Aircraft movement calculation
500–596	Damage calculations from anti-aircraft fire

700–740	Calculation and display of ship on the screen (if visible)
750–790	Calculation and display of torpedo on the screen (if visible)
900–9999	Calculation of torpedo hit/miss
19000–20950	Instructions to screen subroutine
22000–22099	Data of all eight aspects of ship picture subroutine
50000–50200	'Get any key' subroutine
60000–63930	Special colour and sound damage effects for the 64

NOTE: Owners of new ROM PETs will need to alter the key pressed 'PEEK' code in line 120. It should read K = PEEK(166).

The main variables used in this program are as follows:

X	East–west coordinate of aircraft
Y	North–south coordinate of aircraft
X1, Y1	Coordinates of target ship
X4, Y4	Coordinates of torpedo
S	Speed of aircraft in kph
D	Heading of aircraft in degrees
PT	Points total
R	Distance of target ship to aircraft in kilometres
B	Bearing of target ship to aircraft in degrees (0 = north, 90 = east, etc.)
D1	Ship's own heading in degrees
TN	Torpedo number (at present your aircraft will carry any number!)
R5	Distance in kilometres from torpedo to target
TP	If = 1 a torpedo is running
D4	Heading of torpedo
S4	Speed of torpedo (normally 75 kph)
DT	Target ship course alteration in degrees
DN	Number of 'moves' before target ship returns to previous course
TT	Time (in hours or fraction of an hour) for each move elapsed
S1	Speed in kph of target ship
DM	Damage points for hits on aircraft

TORPEDO BOMBER

```
5 REM WALWYN
7 RD=57.2957795
10 REM TORPEDO BOMBER
12 REM  X&Y=COORDINATES OF OUR CRAFT
13 REM  X1&Y1=  ''      '' TARGET
14 REM  X4&Y4=   ''      ''   TORPEDO
20 D=INT(RND(1)*360)
22 D1=90
25 Y=90+INT(RND(1)*15):X=85+INT(RND(1)*15):S=400
50 GOSUB63900
60 PRINTU8$;:POKEUG,U4
75 GOSUB19000
80 GOSUB20000
82 GOSUB22000
85 T=TI
90 PRINTUF$;"███████████████████████"TAB(18)"─┬O┬─███◘┼"
95 POKEUG,U9:PRINTU6$;"████████K<<<<<<<<<<<<<<<<<<<<♥<<<<<<<<<<<<<<<<<<<<<";
96 PRINTU9$;"█                                       ";
97 FORI=1TO8:PRINTU4$;"█                                       ";:NEXTI
99 PRINTU6$;"█K<<<<<<<<<<<<<<<<<<<<♠>>>>>>>>>>>>>>>>>>>>"
100 PRINTU4$;"█SPEED="S"█    ";TAB(15)"HEADING="D"█    ";TAB(30)"P="PT"█    "
101 IF X1=0THENA=RND(1):IFA<.08THENX1=RND(1)*40+X-20:Y1=RND(1)*40+Y-20:GOTO104
103 GOTO105
104 S1=30:GOTO120
105 IF X1=0THENPRINTU4$;"S E A R C H I N G   F O R   T A R G E T"
106 IF X1=0THENPRINT"                                        ":GOTO112
108 IF PSTHENPRINTU0$;"◆ ◆ ◆ ◆ ◆ ◆ ◆ ◆ W R E C K ◆ ◆ ◆ ◆ ◆ ◆ ◆":GOTO110
109 PRINTU6$;"─────────────TARGET──────────────────"
110 PRINT"RANGE="R"█    ";TAB(15)"BEARING="B"█    ";TAB(30)"D="D1"█    "
111 IFR<3THEN PRINT"█████                                      "
112 IF TP=0THEN120
114 R6=R5:R5=INT(SQR((X1-X4)↑2+(Y4-Y1)↑2)*100)/100
116 PRINTU2$;"█████TORPEDO"TN"RUNNING. RANGE TO HIT=      ██████"R5
120 K=PEEK(197)
125 IF K>240THEN190
130 IFK=56THEND=D-15:ZZ=TI:IFD<0THEND=360+D
140 IFK=32THEND=D+15:ZZ=TI:IFD>360THEND=D-360
144 IFK=59THEND=D-1:IFD<0THEND=359
146 IFK=27THEND=D+1:IFD>360THEND=1
150 IF K=60THENTP=1:X4=X+.0001:Y4=Y+.0001:D4=D:S4=75:T4=TI+12000:TN=TN+1
151 IF K=60THENR5=INT(SQR((X1-X4)↑2+(Y4-Y1)↑2)*100)/100:R6=R5:P9=INT(R*10)+5
152 IF K=60THENDD=RND(1):DT=1:DN=INT(RND(1)*45+1):IFDD>.5THENDT=-1
160 IF K=13THEN S=S-20:ZZ=TI-400
170 IF K=10THEN S=S+20:ZZ=TI-400
190 TT=(TI-T)/60/3600:T=TI
200 REM TARGET MOVE
```

```
205 IF DN<=0THEND1=D1-DT:GOTO220
210 IF TPTHEND1=D1+DT:DN=DN-1
220 IF D1=90THEN DN=0:DT=0
240 X1=X1+S1*SIN(D1/RD)*TT:Y1=Y1-S1*COS(D1/RD)*TT
300 REM TORPEDO MOVE
310 X4=X4+S4*SIN(D4/RD)*TT:Y4=Y4-S4*COS(D4/RD)*TT
320 B4=INT(ATN((X4-X)/(Y-Y4))*RD+.01)
330 IF Y-Y4<0THEN B4=B4+180
335 IF B4<0THENB4=360+B4
340 R4=SQR((X4-X)↑2+(Y-Y4)↑2):R4=INT(R4*100)/100
400 X=X+S*SIN(D/RD)*TT:Y=Y-S*COS(D/RD)*TT
450 B=INT(ATN((X1-X)/(Y-Y1))*RD+.01)
451 IF Y-Y1<0THEN B=B+180
452 IF B<0 THEN B=360+B
470 RR=SQR((X1-X)↑2+(Y-Y1)↑2):R=INT(RR*100)/100
500 REM UNDER FIRE
505 IF DM>=1THEN PRINT"SQQQQQQQQH I T "TAB(40)"SPEED"TAB(80)"DROPPING":S=S-5
506 IFDM>1THENPRINT"SQQQQQQQQQQQOUT OF"TAB(40)"CONTROL":D=D-9+INT(RND(1)*18)
510 IF R>=3 OR S1=0 THEN581
520 IF TI<ZZ+500THENPRINT"SQQQQ       U N D E R       F I R E   ":Z=2:GOTO540
530 PRINT"SQQQQ ♣♣ U N D E R    H E A V Y   F I R E ♣♣":Z=6
540 Z=INT(RND(1)*Z+1):FOR Q=1TOZ
545 POKEUH,40:POKEUL,200:POKEUA,15:POKEUW,129:FORH=15TO5STEP-1:POKEUV,H:NEXTH
550 H=INT(RND(1)*360)
```

```
552 IFPEEK(US+640+H)=102THEN580
555 POKE H+US+640,102:POKEUC+H+640,U6:IFH=220THENDM=DM+2:GOSUB60000
556 IF H>=218ANDH<=222THENDM=DM+1:GOSUB60000
560 IF H=180THENDM=DM+2:GOSUB60000
580 NEXT Q:POKEUV,0:POKEUH,0:POKEUL,0:POKEUA,0:POKEUD,0:POKEUW,0
581 IF DM=0THEN700
588 IF S<=100 THEN PRINT"SQQQQQQQTOO SLOW AND YOU STALL AND PLUNGE INTO "
589 IF S<=100 THEN PRINT"THE SEA WITH"PT"POINTS.":GOTO60100
590 IF DM>=3THENPRINT"SQQQQQQQQQQQQRSORRY BUT YOU'VE BEEN HIT AND YOU'VE  █"
592 IF DM>=3THENPRINT"RCRASHED INTO THE SEA WITH "PT"█ POINTS █":GOTO60100
700 REM PICTURE
705 PRINTU4$;"SQQQQQQQQQR"TAB(04)" "
710 PRINT"SQQQQQQQQQQR"TAB(0)"▌▌    ▌██◘     "
715 O3=B-D:IF O3>269THEN O3=O3-360
717 IF O3<-269THENO3=360+O3
720 O=INT((O3)/4.5+0.5)+20
730 IF O>38ORO<1THEN O=239:GOTO750
731 IF R>=12THEN 750
732 OO=INT(SQR(R*3))
735 O=O+(40*(5-OO))
736 I=INT(((D1-B)+27)/45)+1
737 IF I=9THEN I=1
738 IF I<1THEN I=I+8
739 IF PS>0THENI=0
```

c/Bv

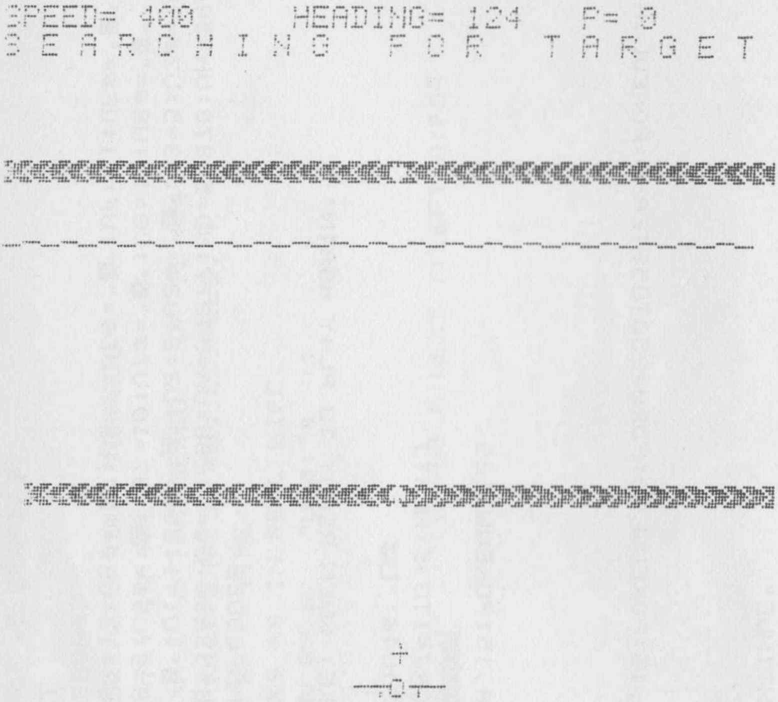
```
740 PRINTU4$;"SQQQQQQQQQQR"TAB(O)D$(I)
750 REM TORPEDO PIC.
755 04=B4-D:IF 04>269 THEN 04=04-360
760 IF 04<-269THEN04=360+04
770 04=INT((04)/4.5+0.5)+20
780 IF04>390R04<0THEN04=239:GOTO800
785 IFR4>=12THEN800
788 00=INT(SQR(R4*3)):04=04+(40*(5-00))
790 PRINTU2$;"SQQQQQQQQQQ"TAB(04)"*"
800 REM PIC.FINISHED
900 REM CHECK IF HIT
901 PRINTUE$;:IF PSTHEN1000
902 IF TP=0THEN 9999
903 IF TI>T4 OR R5>R6 THEN 905
904 GOTO910
905 PRINTU0$;"SQQQ      T O R P E D O      M I S S E D      ":GOTO940
910 IF R5<=.09THEN930
920 GOTO9999
930 PS=P9:PRINTU6$;"SQQQR T A R G E T    H I T !  POINTS=■"PS"■    "
935 PT=PT+PS:S4=0:S1=0
936 TS=TI:S1=0
940 FOR I=1TO1000:NEXT I
950 TP=0:PRINT"SQQQ                                              "
960 X4=0:Y4=0:D4=0:R4=0
```

```
999 GOTO9999
1000 IFTI>TS+1500THEN PS=0:TS=0:D1=90:S1=0:X1=0:Y1=0:GOTO90
9999 GOTO100
19000 POKEUB,U3:PRINT"■■   T O R P E D O       B O M B E R     ";
19001 PRINT"(WALWYN GAMES INC.- 50,ORCHARD RD. TWIK)■";
19005 PRINTUU$;"■YOU ARE A TORPEDO BOMBER ON PATROL OVER
19010 PRINT"THE ATLANTIC.YOU MUST SINK ENEMY SHIPS
19020 PRINT"BY TORPEDO. THE AWFUL BRITISH ENEMY ARE
19030 PRINT"SAILING FROM WEST TO EAST(AMERICA TO UK)
19040 PRINT"MORE POINTS ARE GAINED IF YOUR RANGE
19050 PRINT"OF DROP IS LONG.
19060 PRINT"■REMEMBER THAT THE ENEMY IS MOVING AT
19070 PRINT"AN AVERAGE SPEED OF 30 KMH DUE EAST
19080 PRINT"UNLESS A TORPEDO IS DROPPED AT WHICH
19082 PRINT"POINT SHE WILL ALTER COURSE TO TRY &
19084 PRINT"ESCAPE.SHE MAY RETURN TO 90 DEGREES     LATER IF STILL AFLOAT!"
19086 PRINT"■AT A RANGE OF 3 KILOMETRES SHE WILL
19088 PRINT"OPEN FIRE ON YOU.THE MORE YOU ZIGZAG &
19090 PRINT"CHANGE SPEED THE MÓRE CHANCE YOU HAVE
19092 PRINT"OF NOT BEING HIT.
19300 GOSUB50000:RETURN
20000 PRINTU8$;"■YOUR CONTROLS ARE AS FOLLOWS...
20010 PRINT"■■S....THROTTLE DOWN (20 KM/HR)
20020 PRINT"A....THROTTLE UP (20 KM/HR)
```

```
20030 PRINT"1....HARD TO PORT(15 DEGREES)
20040 PRINT"9....HARD TO STARBOARD(15 DEGREES)
20050 PRINT"2....1 DEGREE TO PORT
20060 PRINT"8....1 DEGREE TO STARBOARD
20100 PRINTU7$;"▒THE SPACE KEY RELEASES YOUR TORPEDO"
20110 PRINT"WHICH RUNS INDEPENDENTLY IN THE
20120 PRINT"DIRECTION DROPPED AT A CONSTANT SPEED   OF 75 KMH"
20500 PRINTU8$;"▒MEASUREMENTS IN KILOMETRES,KMH, DEGREES.";
20505 PRINT"EVERYTHING MOVES IN 'REAL TIME'.
20510 PRINT"▒SHIP'S ASPECT CHANGES AS IN REAL LIFE.
20520 PRINT"▒THE TORPEDO IS SHOWN BY A   "U7$;"*
20950 GOSUB50000:RETURN
22000 FOR I=0TO8:READ D$(I):NEXTI
22004 REM 0=SUNK
22005 REM 1:AWAY 2:NEXT 3:RIGHT 4:FOR 5:TOWARDS 6:NEXT 7:LEFT 8:FOR
22007 DATA "▌▒╲◤▒ ▌██▒□    "
22010 DATA "▌▒ ▌▀╯▒ ▌██▒□ ▄▀|▒▄"
22020 DATA "▌▀╯▒◤ ▌██▒□ ▄▀| ▒▄"
22030 DATA "▌▀▀ ▪▪▒██▒□▗| "
22040 DATA "▌ ◥▀╱▒██▒□ ▄▀ ▌▒▄"
22050 DATA "▌ ▌▀╱▒ ▌██▒□ ▄▀|▒▄"
22060 DATA "▌▀╱▒◤ ▌██▒□ ▄▀| ▒▄"
22070 DATA "▌▀▪ ▪▒██▒□  ▙"
22080 DATA "▌ ◥▀╯▒██▒□ ▄▀ |▒▄"
22099 RETURN
```

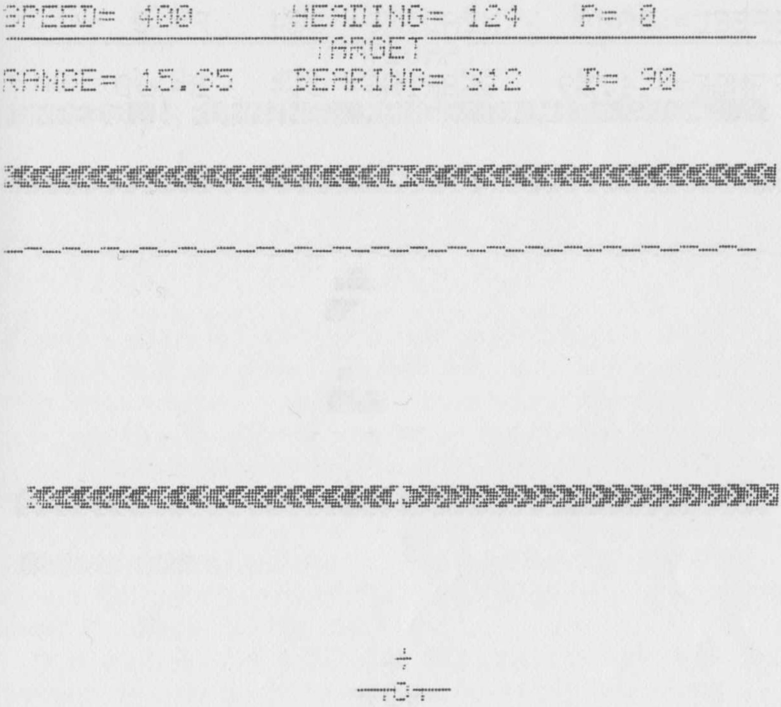
```
50000 PRINT"■■PRESS ANY KEY TO CONTINUE"
50100 GET A$:IF A$="" THEN 50100
50200 RETURN
60000 REM HIT DISPLAY
60005 POKEUH,100:POKEUA,15:POKEUV,15:POKEUW,33:FORH=250TO5STEP-5:POKEUL,H
60010 POKEUB,0:POKEUB,U3:NEXTH
60020 RETURN
60100 REM SHOT DOWN
60110 GETA$:IFA$<>""THEN60110
60120 POKEUH,220:POKEUL,200:POKEUA,15:POKEUW,129
60122 PRINT"■■■■■■■■■■■■■■■■■■■■■■■■■"
60125 FORH=15TO1STEP-1:POKEUV,H:FORJ=1TO35:NEXTJ
60126 IFH/3=INT(H/3)THENPRINTTAB(3)U4$;"□■                                 □"
60127 NEXTH
60129 POKEUG,U1:PRINT"■PRESS ANY KEY WHEN READY TO PLAY AGAIN"
60130 GETA$:IFA$=""THEN60130
60140 POKEUV,0:RUN
63900 REM COMMODORE 64 COLOUR/SOUND CODES
63902 US=1024:UC=55296:UG=53281:UB=53280:UV=54296:UA=54277:UD=54278:UH=54273
63905 UL=54272:UW=54276:U0=0:U0$="■":U1=1:U1$="■":U2=2:U2$="■":U3=5:U3$="■"
63910 U4=6:U4$="■":U5=8:U5$="■":U6=9:U6$="■":U7=10:U7$="■":U8=13:U8$="■"
63915 U9=14:U9$="■":UU=4:UU$="■":UR=12:UR$="■":UE=7:UE$="■":UF=11:UF$="■"
63930 RETURN

READY.
```

Examples of play



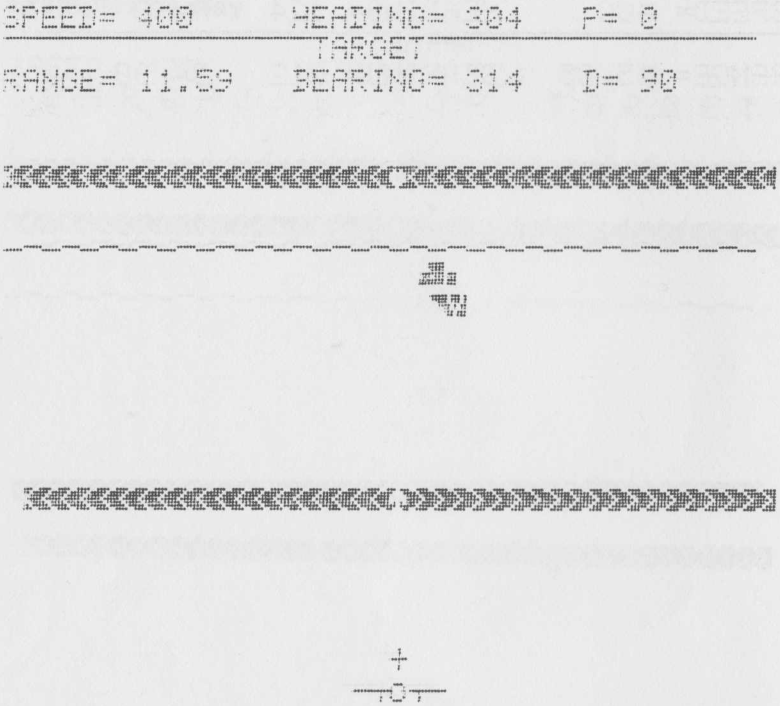
```
SPEED= 400     HEADING= 124   P= 0
S E A R C H I N G   F O R   T A R G E T
```

Just started and nothing in sight yet.



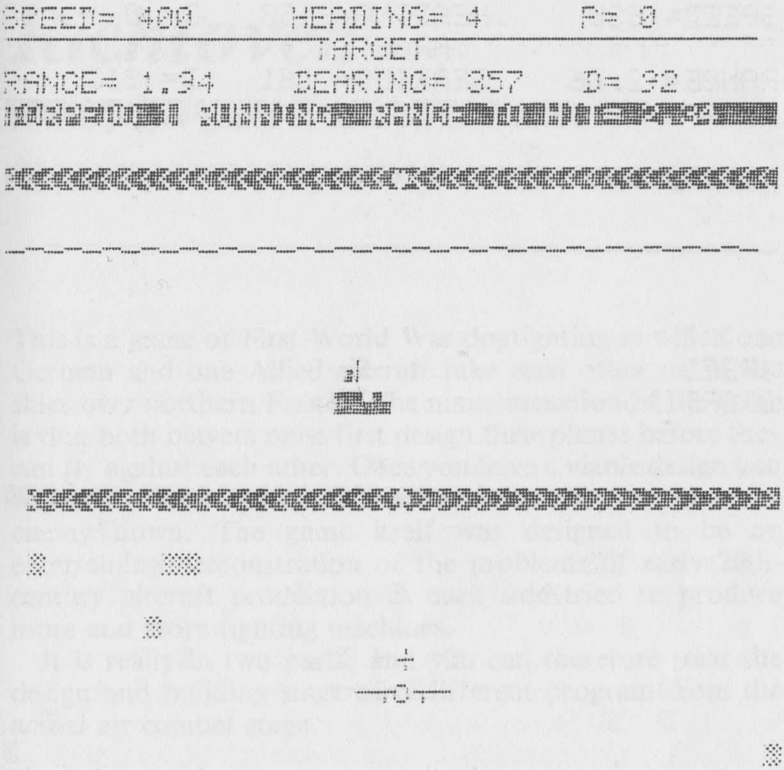
```
SPEED= 400      HEADING= 124    P= 0
                 TARGET
RANGE= 15.35    BEARING= 312    D= 90
```

Target spotted on the radar. I shall hold down key '6' to pull round to the right and steer to intercept.



```
SPEED= 400    HEADING= 304    P= 0
                  TARGET
RANGE= 11.59   BEARING= 314    D= 90
```

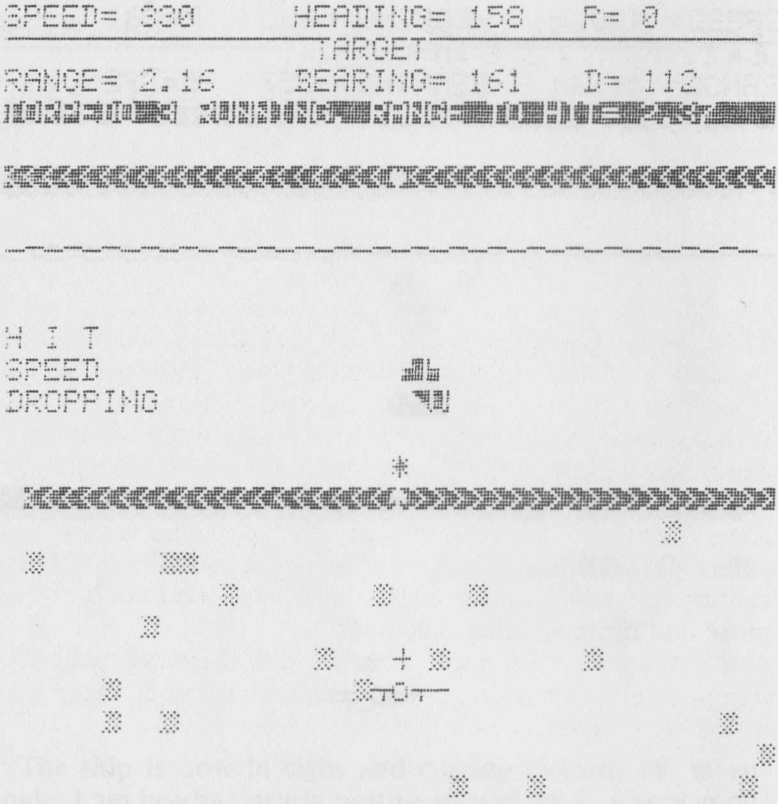
The ship is now in sight and coming towards me at an angle. I am heading nearly north-east and not in a very good position to attack.



```
SPEED= 400         HEADING= 4          P= 0
                     TARGET
RANGE= 1.34      BEARING= 357      D= 32
```

I have steered round to the west and come on to the target beam on. My first torpedo has been dropped and is 2.34 kilometres from the target. Enemy fire is not very accurate as I have been twisting and turning in the air to avoid being hit.

The torpedo subsequently missed, and I come round again with two more torpedo attacks.



```
SPEED= 330        HEADING= 158    P= 0
                     TARGET
RANGE= 2.16       BEARING= 161    D= 112

H I T
SPEED
DROPPING
```

An attack from the left and behind the ship (i.e. on its port quarter). It has now altered course to the south to try to put my aim off. Torpedo number three is running, but I have been hit on the port wing and am losing speed. I shall need to keep holding down key ‘3’ to stop myself from stalling and crashing into the sea. The torpedo, marked by a *, is going to miss again.

About three seconds after this, I receive a direct hit on the nose and fall into the sea. Hopefully I shall be picked up!

Richtoven

A two-player game of 1916 aerial combat

This is a game of First World War dogfighting in which one German and one Allied aircraft take each other on in the skies over northern France. The main attraction of the game is that both players must first design their planes before they can fly against each other. Once you have a viable design you can then test it against the opposition and try to shoot the enemy down. The game itself was designed to be an entertaining demonstration of the problems of early 20th-century aircraft production as each side tried to produce more and more fighting machines.

It is really in two parts, and you can therefore treat the design and building stage as a different program from the actual air combat stage.

How to play

On running the program, each side in turn will be asked a number of questions about their aircraft design. The German player goes first. Firstly you will be asked what basic type of aircraft you would like to build. The calculations are based on a German manual of aircraft performance (dated 1921) which I discovered one day in my local library, so I had better point out to you some of the basic issues in case you are not totally familiar with the science of aircraft production in the First World War!

A 1916 monoplane was an experimental plane in which many problems of structural strength were still unsolved owing to the relative inefficiency of aircraft engines. Only choose this option if you know what you are doing, or you will end up with something that won't even take off! Triplanes need a large engine to get them up owing to the weight of the airframe, but they can be very manoeuvrable in flight if a little slow. Biplanes are the best compromise if you are new to the game.

The next question concerns the weight and strength of the airframe design. Too much strength will slow you down and restrict your ceiling. Too little will make you extremely vulnerable to enemy fire power, and you may fall apart on the ground!

When asked for the emphasis on speed from 1 to 10, remember what sort of aircraft you have ordered in the first place. A triplane will need as much speed as possible, whilst a monoplane is designed as a fast aircraft anyway, so you needn't put too much emphasis on speed. Remember that too much design speed reduces the design 'lift' of your wing, so you may end up with a very high minimum flight speed (i.e. stalling speed) which could be awkward.

Next you will be asked for the power of your engine from 1 to 10. Obviously you will need power, but too much will result in excess weight, and you may flounder about at low altitude. An aircraft which is overpowered will become unstable with a strong tendency to pull to the right.

The last two questions concern your offensive capacity. When in doubt, go for a high calibre forward-firing gun. The heavier it is, the more unmanageable you will become, but your effective gun range is bound to be greater.

The final question concerns the number of rounds of ammunition (in bursts) you are to carry with you. Obviously the more you carry, the greater the weight problem, but you will certainly need to carry at least ten bursts. If you have to spend the whole time landing and then taking off again to replenish your stocks, you aren't going to be able to fight effectively.

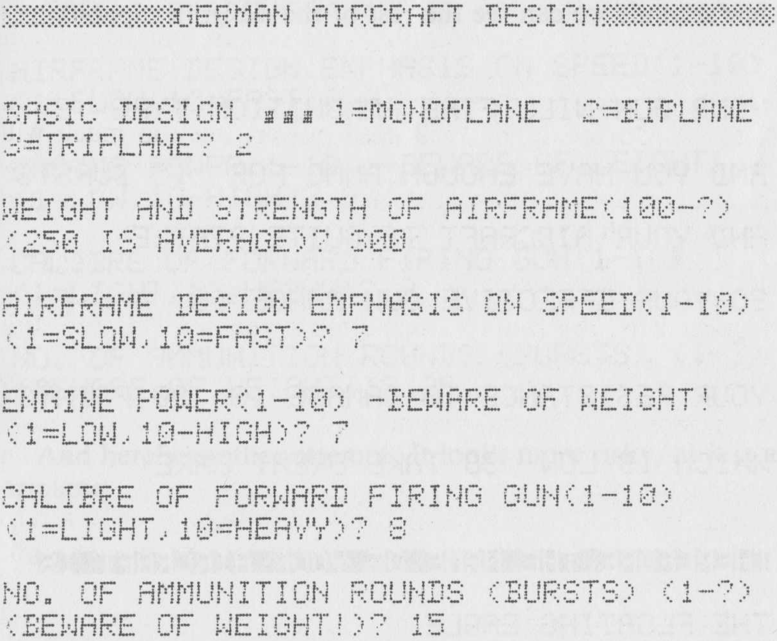
Having designed your aircraft, you will then receive an assessment of your plane's effectiveness. The things to look out for are:

1 The maximum ceiling in feet
2 The maximum speed and more importantly, the MINIMUM speed at which you can fly

3 Your manoeuvrability factor (0–10: 0 is excellent, 10 is bad).

The manoeuvrability factor affects the computer's response to your commands when the time comes for action. A figure of 0 or 1 will mean that every time you press a command key the machine will instantly answer your directives. A high figure will result in seemingly endless pressings of a 'climb', 'dive', 'left' or 'right' key before anything happens. This factor is the single most important one in combat. If you're like a flying brick, you won't be able to do anything!

The design



```
▒▒▒▒▒▒▒▒▒GERMAN AIRCRAFT DESIGN▒▒▒▒▒▒▒▒▒


BASIC DESIGN ■■■ 1=MONOPLANE  2=BIPLANE
3=TRIPLANE? 2

WEIGHT AND STRENGTH OF AIRFRAME(100-?)
(250 IS AVERAGE)? 300

AIRFRAME DESIGN EMPHASIS ON SPEED(1-10)
(1=SLOW,10=FAST)? 7

ENGINE POWER(1-10) -BEWARE OF WEIGHT!
(1=LOW,10-HIGH)? 7

CALIBRE OF FORWARD FIRING GUN(1-10)
(1=LIGHT,10=HEAVY)? 8

NO. OF AMMUNITION ROUNDS (BURSTS) (1-?)
(BEWARE OF WEIGHT!)? 15
```

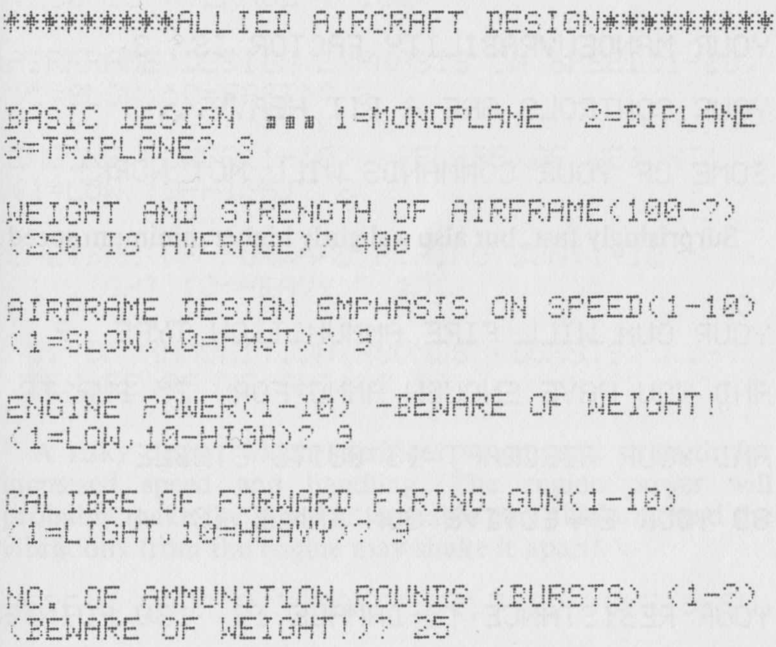
Here's a fairly good design which hopefully will prove to be a good flyer.

```
HERE'S YOUR AIRCRAFT BUILT TO YOUR SPEC.

YOUR MAXIMUM CEILING IS 6800

YOUR MAXIMUM SPEED = 6 ,MINIMUM = 2

YOU CAN ALMOST STAND STILL IN THE AIR!

YOUR MANOEUVRABILITY FACTOR IS  2
```

An excellent manoeuvrability factor with a fairly low maximum speed, but good minimum flying speed. After a few seconds we can see the rest of the design's capabilities.

```
YOUR GUN WILL FIRE AMMUNITION TYPE  8

AND YOU HAVE ENOUGH AMMO FOR  15 BURSTS

AND YOUR AIRCRAFT IS QUITE STABLE

SO YOUR EFFECTIVE GUN RANGE IS  4

YOUR RESISTANCE TO DAMAGE IS  90 POINTS

WHICH IS LOW- SO TAKE GREAT CARE!

THEREFORE THE NAME OF YOUR AIRCRAFT IS

THE FLOATING EAGLE
```

Sturdiness and damage resistance have been sacrificed for extra flight handling capabilities. As you can see, each aircraft is given a name which signifies its approximate qualities. This is, of course, only for fun, but it does generally show you what the computer reckons of your design. If it won't fly at all, then you will get some rather unpleasant remarks printed on the screen. You may even be asked to build another one! The worst name you can be given is 'the solid brick'! The name for the very best design (I have never designed such a craft!) is 'the unbeatable angel'.



```
*********ALLIED AIRCRAFT DESIGN*********


BASIC DESIGN ... 1=MONOPLANE  2=BIPLANE
3=TRIPLANE? 3

WEIGHT AND STRENGTH OF AIRFRAME(100-?)
(250 IS AVERAGE)? 400

AIRFRAME DESIGN EMPHASIS ON SPEED(1-10)
(1=SLOW,10=FAST)? 9

ENGINE POWER(1-10) -BEWARE OF WEIGHT!
(1=LOW,10-HIGH)? 9

CALIBRE OF FORWARD FIRING GUN(1-10)
(1=LIGHT,10=HEAVY)? 9

NO. OF AMMUNITION ROUNDS (BURSTS) (1-?)
(BEWARE OF WEIGHT!)? 25
```

And here's another attempt. It looks more risky, as it is a triplane.

```
HERE'S YOUR AIRCRAFT BUILT TO YOUR SPEC.

YOUR MAXIMUM CEILING IS  8650

YOUR MAXIMUM SPEED = 7 ,MINIMUM = 3

YOUR MANOEUVRABILITY FACTOR IS  3

YOUR CONTROLS ARE A BIT HEAVY...

SOME OF YOUR COMMANDS WILL NOT WORK!
```

Surprisingly fast, but also a slightly higher minimum speed.

```
YOUR GUN WILL FIRE AMMUNITION TYPE  9

AND YOU HAVE ENOUGH AMMO FOR  25 BURSTS

AND YOUR AIRCRAFT IS QUITE STABLE

SO YOUR EFFECTIVE GUN RANGE IS  4

YOUR RESISTANCE TO DAMAGE IS  130 POINTS

THEREFORE THE NAME OF YOUR AIRCRAFT IS

THE FLYING CROW
```

The ‘flying crow’ probably sums this one up. It is heavier and faster than the German plane, but lacks good handling capabilities and has the same effective gun range as the other plane. Neither of these designs is particularly bad. Just to show you how not to do it, here’s another example.

```
▒▒▒▒▒▒▒▒▒▒GERMAN AIRCRAFT DESIGN▒▒▒▒▒▒▒▒▒▒

BASIC DESIGN ▪▪▪ 1=MONOPLANE  2=BIPLANE
3=TRIPLANE? 2

WEIGHT AND STRENGTH OF AIRFRAME(100-?)
(250 IS AVERAGE)? 150

AIRFRAME DESIGN EMPHASIS ON SPEED(1-10)
(1=SLOW,10=FAST)? 8

ENGINE POWER(1-10) -BEWARE OF WEIGHT!
(1=LOW,10=HIGH)?8

CALIBRE OF FORWARD FIRING GUN(1-10)
(1=LIGHT,10=HEAVY)? 10

NO. OF AMMUNITION ROUNDS (BURSTS) (1-?)
(BEWARE OF WEIGHT!)? 30
```

A risky design which sacrifices weight and strength for increased speed and handling. The engine power will probably make the plane an unstable gun platform, and the vibrations from the engine may shake it apart!

```
HERE'S YOUR AIRCRAFT BUILT TO YOUR SPEC.


YOUR MAXIMUM CEILING IS  2000


YOUR MAXIMUM SPEED = 11 ,MINIMUM = 4


YOUR MANOEUVRABILITY FACTOR IS  1

YOUR AIRCRAFT IS HIGHLY MANOEUVRABLE!

WELL DONE!
```

Well, here's good news. An amazingly high speed for this little light aircraft and a very good manoeuvrability factor. But what happens when we start up the engine?

```
YOUR GUN WILL FIRE AMMUNITION TYPE  10

AND YOU HAVE ENOUGH AMMO FOR  30 BURSTS

BUT YOUR AIRCRAFT IS UNSTEADY IN FLIGHT

SO YOUR EFFECTIVE GUN RANGE IS  3

YOUR RESISTANCE TO DAMAGE IS -90 POINTS

SO YOU'VE FALLEN APART ON THE GROUND!

VERY BAD DESIGN!  TRY AGAIN...
```

As I feared, the aircraft is completely unstable, so your effective gun range is low. Worse than that, the entire machine falls apart the moment you shout 'Contact!' It's a bit like mounting a Rolls-Royce jet engine in a small two-seater Cessna: the engine is just too powerful for the airframe!

Combat

Once both players have completed their design operations, the screen will clear and display the 'battle map'. The German plane is pictured at the bottom right of the screen about to take off on its runway, while the Allied craft is at the top left on its own airstrip. At the top of the screen you will see two rows of facts. The German plane and statistics are on a reverse field, and the allied information is in normal white on black. The factual information at the top gives (from left to right) the altitude (H), the amount of ammunition left on board the aircraft, the speed of each plane and your survival (damage) points which will decrease with any hits you receive from enemy fire or damage owing to bad flying. If the points value falls to 0, you will crash.

To fire and hit your enemy, you have to be flying straight at him and be within 250 feet of him in altitude.

The screen will also display, with alternate flashes, your minimum flying speed. This is shown on the ground to point out to you where your aircraft hangar is.

Taking off can be quite an exercise in itself since you may have manoeuvrability problems. The best thing to do is to build up your speed as you taxi down the runway until you are going faster than your minimum flying speed. Then 'go up' by one lot of 250 feet and, once airborne, try to gain extra height. Every time you climb, you lose one speed point and every time you dive you gain one speed point. Watch your airspeed closely and remember that not all your commands will work if you have bad manoeuvrability. If you run out of ammunition, then land again down the runway and carefully move into the 'hangar' to refuel and reload.

I would strongly advise you to 'learn to fly' before you take on an enemy in the air! It is difficult enough to get airborne, move about and land accurately again, let alone to avoid being shot down. More people seem to crash from pilot error in this game than from anything else!

The commands for flying are as follows:

	German Aircraft	*Allied Aircraft*
To accelerate one speed point	C	M
To decelerate one speed point	Z	B
To climb 250 feet	W	I
To dive 250 feet	X	N
To move the aircraft to port	A	H
To move the aircraft to starboard	D	K
To fire your forward cannon	S	J

I have beaten all comers with a spectacular design I will not tell you about! If you shoot down more than five enemy aircraft without crashing yourself, then you're doing pretty well.

The program

Breakdown of listing

Lines	
30–99	Data loading and initial design subroutine sender
100–199	Calculations and display of aircraft in flight
200–380	Find which key was pressed last
400–440	German plane turning right subroutine
450–490	German plane turning left subroutine
500–590	German plane opening fire subroutine
600–640	Allied plane turning right subroutine
650–690	Allied plane turning left subroutine
700–790	Allied plane opening fire subroutine
800–905	Check for damage subroutine
910–950	Display hangar and runways
1000–1045	Allied victory
2000–2035	German victory
5000–5050	Initial position subroutine
6000–6090	Design input subroutine
6100–6920	Design evaluation and display of results

The main variables used in the program are as follows:

GS	German speed
GH	German height
GA	German ammunition remaining
AS	Allied speed
AH	Allied height
AA	Allied ammunition
GD	German aircraft movement addition
GC	German aircraft screen display POKE number
AD	Allied aircraft movement addition
AC	Allied aircraft screen display POKE number

GP	German position on screen (0–999)
AP	Allied position on screen (0–999)
GX, AX	Strength points remaining
G1, A1	Maximum height of aircraft
G2, A2	Maximum speed of aircraft
GT, AT	Calibre of gun
GR, AR	Range of gun
GM, AM	Manoeuvrability factor

RICHTOVEN

```
2 REM WALWYN C.C.
5 REM AIRWAR
20 GOSUB63900
30 DIM C1$(12),C2$(12)
40 G=US-1:A5=205:G5=835:PA=A5:PG=G5
50 DATA SOLID,LEADEN,FLOUNDERING,SINKING,SWIMMING,FLOATING,FLYING,SOARING
52 DATA SINGING,CELESTIAL,ROCKET
54 DATA BEE,SWALLOW,WASP,EAGLE,CROW,PELICAN,OSTRICH,DODO,FROG,TURTLE,BRICK
56 FOR I=0 TO 10
58 READ C1$(I):NEXT I
60 FORI=0 TO10
62 READ C2$(I):NEXT I
70 GOSUB 6000
96 GOSUB5000
98 POKEUG,U1:POKEUB,UF
99 PRINT"■":POKEUG,U4
100 POKE G+PG,32:POKEG+GP,GC:PG=GP
101 POKE G+PA,32:POKEG+AP,AC:PA=AP
102 Q%=RND(1)*10+1
105 IF AH=750 OR GH=750 GOTO 110
106 IF AA=9 OR GA=9 GOTO110
107 IF AX<100 AND E=0 THEN E=1:GOTO110
108 IF GX<100 AND F=0 THEN F=1:GOTO110
109 GOTO 116
110 PRINT"■                                     "
112 PRINT"■                                     "
116 PRINT"■H="AH,"AMMO="AA,"SPD="AS,"PTS="AX
117 PRINT"■■H="GH,"AMMO="GA,"SPD="GS,"PTS="GX"■"
120 IF GX<=0 THEN 1000
130 IF AX<=0 THEN 2000
140 IF GH>G1 THEN GH=G1:GS=GS-1
150 IF AH>A1 THEN AH=A1:AS=AS-1
160 IF GS>G2 THEN GX=GX-Q%*2:GS=G2
165 IF AS>A2 THEN AX=AX-Q%*2:AS=A2
180 GOSUB200
183 GOSUB800
184 GZ=GZ+GS:AZ=AZ+AS
187 IF GZ>5 THEN GP=GP+GD:GZ=GZ-6:GOTO187
189 IF AZ>5 THEN AP=AP+AD:AZ=AZ-6:GOTO189
190 IF GA<0 THEN GA=0
191 IF AA<0 THEN AA=0
195 IF AP<=0 THEN AP=AP+1000
196 IF AP>1000 THEN AP=AP-1000
197 IF GP>1000 THEN GP=GP-1000
198 IF GP<=0 THEN GP=GP+1000
199 GOTO100
```

```
200 GET A$:IF A$=""THEN RETURN
210 IF A$="W" AND GM<Q% THEN GS=GS-1:GH=GH+250
220 IF A$="X" AND GM<Q% THEN GS=GS+1:GH=GH-250
230 IF A$="D" THEN 400
235 IF A$="A" THEN 450
240 IF A$="Z" THEN GS=GS-1
250 IF A$="C" THEN GS=GS+1
260 IF A$="S" THEN GA=GA-1:GOTO500
300 IF A$="I" AND AM<Q% THEN AS=AS-1:AH=AH+250
310 IF A$="N" AND AM<Q% THEN AS=AS+1:AH=AH-250
320 IF A$="K" THEN 600
325 IF A$="H" THEN 650
330 IF A$="B" THEN AS=AS-1
340 IF A$="M" THEN AS=AS+1
350 IF A$="J" THEN AA=AA-1:GOTO700
380 RETURN
400 IF Q%<GM THEN RETURN
405 IF GD=-1 THEN GD=-40:GC=241:RETURN
410 IF GD=-40 THEN GD=1:GC=235:RETURN
420 IF GD=1 THEN GD=40:GC=242:RETURN
430 IF GD=40 THEN GD=-1:GC=243:RETURN
440 RETURN
450 IF Q%<GM THEN RETURN
455 IF GD=-1 THEN GD=40:GC=242:RETURN
```

```
460 IF GD=40 THEN GD=1:GC=235:RETURN
470 IF GD=1 THEN GD=-40:GC=241:RETURN
480 IF GD=-40 THEN GD=-1:GC=243:RETURN
490 RETURN
500 FOR I=1 TO GR
505 IF GA<0 THEN RETURN
506 IFGP+GD*I<0ORGP+GD*I>1000THENRETURN
507 GOSUB62000
510 POKE G+GP+GD*I,42
520 POKE G+GP+GD*I,32
525 GOSUB62100
530 IF GP+GD*I=AP THEN 547
540 NEXT I
545 RETURN
547 X=Q%*(GT+GR-I)
550 IF GH=AH OR GH=AH+250 OR GH=AH-250 THEN AX=AX-X:GOTO570
560 RETURN
570 IF AX<=100 THEN AH=AH-250
575 GOSUB62200
580 GOSUB62100
590 RETURN
600 IF Q%<AM THEN RETURN
605 IF AD=-1 THEN AD=-40:AC=113:RETURN
610 IF AD=-40 THEN AD=1:AC=107:RETURN
```

```
620 IF AD=1 THEN AD=40:AC=114:RETURN
630 IF AD=40 THEN AD=-1:AC=115:RETURN
640 RETURN
650 IF Q%<AM THEN RETURN
655 IF AD=-1 THEN AD=40:AC=114:RETURN
660 IF AD=40 THEN AD=1:AC=107:RETURN
670 IF AD=1 THEN AD=-40:AC=113:RETURN
680 IF AD=-40 THEN AD=-1:AC=115:RETURN
690 RETURN
700 FOR I=1 TO AR
705 IF AA<0 THEN RETURN
706 IFAP+AD*I<0ORAP+AD*I>1000THENRETURN
707 GOSUB62000
710 POKE G+AP+AD*I,42
720 POKE G+AP+AD*I,32
725 GOSUB62100
730 IF AP+AD*I=GP THEN 747
735 NEXT I
740 RETURN
747 X=Q%*(AT+AR-I)
750 IF AH=GH OR AH=GH+250 OR AH=GH-250 THEN GX=GX-X:GOTO 770
760 RETURN
770 IF GX<=100 THEN GH=GH-250
775 GOSUB62200
```

```
780 GOSUB62100
790 RETURN
800 IF AP=A5 AND AH=0 AND AS=0 THEN AA=A4
827 IF GP=G5 AND GH=0 AND GS=0 THEN GA=G4
863 FOR B=0TO7
864 IF AP=A5+B*40 THEN AY=1
865 IF AP=A5+B*40 AND AH=0 GOTO878
867 NEXT B
870 IF AS<G3 AND AH>0 THEN AH=AH-500:AX=AX-Q%:POKE G+AP,0
875 IF AH<=0 THEN GOTO2000
878 FOR B=0TO7
879 IF GP=G5-B*40 THEN GY=1
880 IF GP=G5-B*40 AND GH=0 GOTO900
882 NEXT B
883 IF GS<G3 AND GH>0 THEN GH=GH-500:GX=GX-Q%:POKE G+GP,0
885 IF GH<=0 THEN GOTO1000
900 IF AY=1 OR GY=1 THEN AY=0:GY=0:GOTO910
905 RETURN
910 POKE G+A5,48+A3
920 POKE G+G5,176+G3
930 FOR B=1TO7
933 POKE G+A5+B*40,102
936 POKE G+G5-B*40,102
939 NEXT B
```

```
950 RETURN
1000 PRINT"▙GERMAN AIRCRAFT CRASHES!"
1020 AV=AV+1:GV=0
1030 PRINT"████TOTAL ALLIED VICTORIES="AV
1035 PRINT"███DO YOU WISH YOUR OLD AIRCRAFT BACK(Y/N)":INPUTB$
1038 IF B$="Y" THEN J=1:GOSUB6100
1039 IF B$="Y" THEN 96
1040 J=1:GOSUB6036
1045 GOTO96
2000 PRINT"▙ALLIED AIRCRAFT CRASHES!
2010 GV=GV+1:AV=0
2020 PRINT"█████TOTAL GERMAN VICTORIES="GV
2025 PRINT"███DO YOU WISH YOUR OLD AIRCRAFT BACK(Y/N)":INPUTB$
2028 IF B$="Y" THEN J=2:GOSUB6100
2029 IF B$="Y" THEN 96
2030 J=2:GOSUB6036
2035 GOTO96
5000 AH=0:GH=0
5005 GA=G4:AA=A4
5010 PG=G5:GP=G5:GS=0:GD=-40:GC=241
5020 PA=A5:AP=A5:AS=0:AD=40:AC=114
5030 E=0:F=0
5050 RETURN
6000 FOR J=1TO2
```

```
6036 POKEUG,UF:POKEUB,U3
6037 IF J=1 THEN PRINTUR$;"▙█████████GERMAN AIRCRAFT DESIGN████████
6038 IF J=2 THEN PRINTU7$;"▙*********ALLIED AIRCRAFT DESIGN********
6040 PRINT"█BASIC DESIGN ▪▪▪ 1=MONOPLANE  2=BIPLANE 3=TRIPLANE":INPUTD(J)
6050 PRINT"█WEIGHT AND STRENGTH OF AIRFRAME(100-?)  (250 IS AVERAGE)":INPUTP(J)
6060 PRINT"█AIRFRAME DESIGN EMPHASIS ON SPEED(1-10) (1=SLOW,10=FAST)":INPUTS(J)
6070 PRINT"█ENGINE POWER(1-10) -BEWARE OF WEIGHT!  (1=LOW,10-HIGH)":INPUTM(J)
6080 PRINT"█CALIBRE OF FORWARD FIRING GUN(1-10)     (1=LOW,10=HIGH)":INPUTDT(J)
6090 PRINT"█NO. OF AMMUNITION ROUNDS (BURSTS) (1-?) (BEWARE WEIGHT)":INPUTDA(J)
6100 POKEUG,U2:PRINTUU$;"▙HERE'S YOUR AIRCRAFT BUILT TO YOUR SPEC.
6200 H%=M(J)*1500-P(J)*10-DT(J)*150-DA(J)*100+D(J)*1000
6210 S%=M(J)-(P(J)/50-S(J))-D(J)*1.5
6215 I%=1000/P(J)-DA(J)/10+S(J)/2
6220 N%=S%-I%
6230 IF N%<2 THEN N%=2
6240 M%=6-I%+S(J)/3+M(J)/3+DT(J)/3-D(J)*3
6250 IF M%<0 THEN M%=0
6260 X%=P(J)-S(J)*30
6270 R%=DT(J)/(M%+1)+X%/50
6280 M=INT(H%/3000+S%)-3
6290 N=INT((M%+(12-R%)/1.5)/1.5)
6310 PRINT"█YOUR MAXIMUM CEILING IS "H%
6313 IF H%<=0 THENPRINT"█TOO HEAVY TO GET OFF THE GROUND!":GOTO6900
6315 IF H%<2000 THEN PRINT"█WHICH IS PRETTY USELESS! WHY SO HEAVY?
```

28000

new

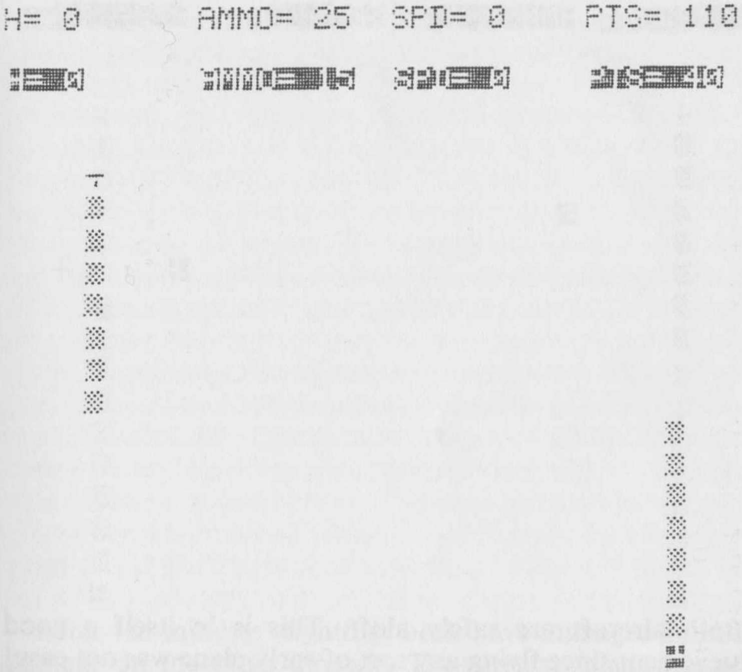
118 line

```
6317 IF H%<6000 THEN PRINT"█WHICH IS LOW, SO WATCH YOUR HEIGHT! "
6330 PRINT"██YOUR MAXIMUM SPEED ="S%",MINIMUM ="N%
6333 IF S%<2 THEN PRINT"██YOUR AIRCRAFT IS TOO SLOW TO FLY!":GOTO6900
6337 IF S%<5 THEN PRINT"█YOU'RE SOMETHING OF A SNAIL!
6338 IF N%<3 THEN PRINT"█YOU CAN ALMOST STAND STILL IN THE AIR!
6340 IF S%-N%<3 THEN PRINT"█YOU DON'T HAVE MUCH CHOICE OF SPEEDS!
6342 IF S%-N%<1 THEN PRINT"██YOUR DESIGN IS TOTALLY UNFLYABLE! ":GOTO6900
6345 PRINT"██YOUR MANOEUVRABILITY FACTOR IS "M%
6347 IF M%>9 THEN PRINT"█WHICH MAKES IT A 'DEATH TRAP!'":GOTO6900
6350 IF M%<2 THEN PRINT"█YOUR AIRCRAFT IS HIGHLY MANOEUVRABLE!   █WELL DONE!
6355 IF M%>2 AND M%<5 THEN PRINT"█YOUR CONTROLS ARE A BIT HEAVY..."
6358 IF M%>4 THEN PRINT"█YOU HAVE DESIGNED A FLYING BRICK!     "
6360 IF M%>2 THEN PRINT"█SOME OF YOUR COMMANDS WILL NOT WORK!
6370 PRINT"███PRESS ANY KEY█"
6375 GET C$:IF C$="" GOTO6375
6380 PRINT"█YOUR GUN WILL FIRE AMMUNITION TYPE "DT(J)
6390 PRINT"█AND YOU HAVE ENOUGH AMMO FOR "DA(J)"BURSTS"
6400 IF R%<4 THEN PRINT"█BUT YOUR AIRCRAFT IS UNSTEADY IN FLIGHT
6410 IF R%>3 AND R%<7 THEN PRINT"█AND YOUR AIRCRAFT IS QUITE STABLE
6420 IF R%>6 THEN PRINT"█YOUR AIRCRAFT IS AS STEADY AS A ROCK
6430 PRINT"█SO YOUR EFFECTIVE GUN RANGE IS "R%
6440 PRINT"██YOUR RESISTANCE TO DAMAGE IS "X%"POINTS
6445 IF X%<0 THEN PRINT"█SO YOU'VE FALLEN APART ON THE GROUND!":GOTO6900
6450 IF X%<100 THEN PRINT"█WHICH IS LOW- SO TAKE GREAT CARE!
```

```
6460 IF X%>250 AND X%<350 THEN PRINT"■AND THAT'S PRETTY STURDY!
6470 IF X%>349 THEN PRINT"■SO IT'LL TAKE A LOT TO SHOOT YOU DOWN!
6500 PRINT"■■■THEREFORE THE NAME OF YOUR AIRCRAFT IS"
6510 PRINT"■THE "C1$(M)" "C2$(N)
6515 PRINT"■■■PRESS ANY KEY■
6517 GET C$:IF C$="" GOTO6517
6520 IF J=2 GOTO 6600
6540 GX=X%:GM=M%:GR=R%:GT=DT(J)
6560 G1=H%:G2=S%:G3=N%:G4=DA(J)
6570 IF AV>0 THEN RETURN
6580 NEXT J
6600 AX=X%:AM=M%:AR=R%:AT=DT(J)
6610 A1=H%:A2=S%:A3=N%:A4=DA(J)
6800 RETURN
6900 PRINTU1$;"■VERY BAD DESIGN!  TRY AGAIN...
6910 FOR A=1 TO 3500:NEXT A
6920 GOTO6036
62000 POKEUA,5:POKEUH,41:POKEUL,20:POKEUW,129:POKEUV,15:RETURN
62100 POKEUA,0:POKEUD,0:POKEUH,0:POKEUL,0:POKEUW,0:POKEUV,0:RETURN
62200 POKEUA,16:POKEUD,200:POKEUV,15:POKEUL,64:FORUP=1TO25:POKEUH,240-UP
62210 POKEUW,33:NEXTUP:RETURN
63900 REM COMMODORE 64 COLOUR/SOUND CODES
63902 US=1024:UC=55296:UG=53281:UB=53280:UV=54296:UA=54277:UD=54278:UH=54273
63905 UL=54272:UW=54276:U0=0:U0$="■":U1=1:U1$="■":U2=2:U2$="■":U3=5:U3$="■"
```

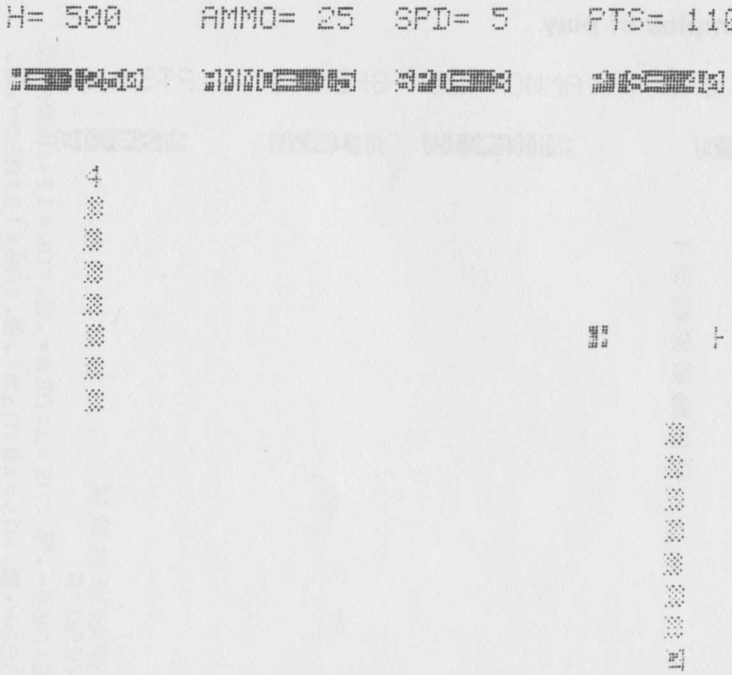
```
63910 U4=6:U4$="▣":U5=8:U5$="◫":U6=9:U6$="▚":U7=10:U7$="⊠":U8=13:U8$="■"
63915 U9=14:U9$="◘":UU=4:UU$="▒":UR=12:UR$="◬":UE=7:UE$="◩":UF=11:UF$="▣"
63920 POKEUA,5:POKEUH,21:POKEUL,60:POKEUD,0
63930 RETURN

READY.
```

Examples of play



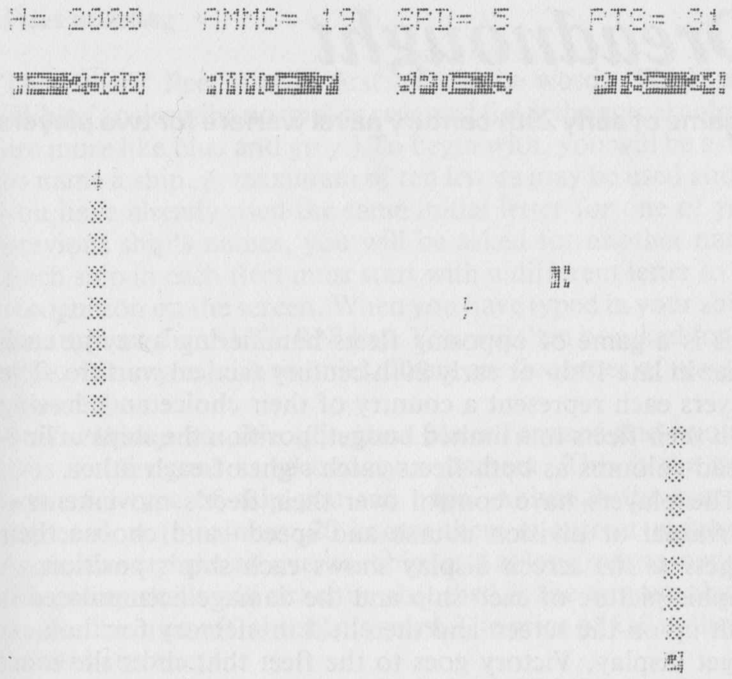
```
H= 0      AMMO= 25   SPD= 0      PTS= 110
```

The start of the combat phase. The German aircraft is at the right about to taxi down the runway and take off. It has low resistance to damage, but better flying characteristics.



```
H= 500    AMMO= 25  SPD= 5    PTS= 110
```

Both aircraft are safely aloft. This is in itself a good achievement since flying any sort of early plane was not easy! The German plane has a height advantage over the Allied one and is well placed behind it to dive to the attack. So far neither side has fired a shot.



```
H= 2000   AMMO= 19  SPD= 5    PTS= 31
```

After ten minutes' fighting, both have managed to inflict damage on the other aircraft. The German plane has once again climbed higher and, although it has less ammunition, is still able to manoeuvre into a better attacking position. The Allied plane has suffered a lot from the strength of the German high calibre gun. It can't be long now.

```
ALLIED AIRCRAFT CRASHES!



TOTAL GERMAN VICTORIES= 1
```

Well, that says it all really! It's back to the drawing board to beat the new German ace.

Dreadnought

A game of early 20th-century naval warfare for two players

This is a game of opposing fleets hammering away at each other in late 19th- or early 20th-century tactical warfare. The players each represent a country of their choice and, having built their fleets to a limited budget, position the ships in line-ahead columns as both fleets catch sight of each other.

The players have control over their fleet's movements – individual or division course and speed – and choose their targets as the screen display shows each ship's position. A graphic picture of each ship and the damage accumulated is built up on the screen and then held in memory for the next target display. Victory goes to the fleet that sinks the most valuable collection of ships.

It is quite a quick game to play with a small number of ships, but the screen becomes somewhat crowded when there are large fleets. I find the best encounters are between five or six ships of opposing types as the tactical problems are best encountered when the data are in relatively simple proportions. Also you may not have enough memory to build an entire fleet of twenty-six vessels for each side – and even if you have, the game might then take two days to complete!

Playing the game

On running the program, at present I have included instructions. Obviously they can be removed to save extra memory, so I shall give you a more complete set of rules here.

Both players type in their respective countries and then – either in secret or while the other player is watching – they set about choosing their fleets.

Fleet building

The 'Black' fleet is built first. (I use the words 'Black' and 'White' to describe normal or reversed field; the actual colours are more like blue and grey.) To begin with, you will be asked to name a ship. A maximum of ten letters may be used and, if you have already used the same initial letter for one of your previous ship's names, you will be asked for another name. Each ship in each fleet must start with a different letter to aid recognition on the screen. When you have typed in your ship's name, press the 'RETURN' key. You will then be asked for the type of ship you wish to build. There are five types of vessel to choose from:

1 *Battleship* has five 12in guns (three forward and two aft) plus six 6in guns as secondary armament. This is the most powerful type of ship you can have. Although the speed is rather slow (maximum 20 knots) there is a great weight of protective armour all over the ship, and at long ranges many of the enemy shells will either be absorbed in the armour plating or else 'bounce off' the ship's sides. The price of £10 million is in 1914 currency!

2 *Old battleship* is a pre-1900 design which is very slow (18 knots) and does not have the effective armour plating of the new battleships. It still has a fair main armament (three 12in guns) and a large secondary armament (six 6in guns), but is liable to be sunk much more easily than the new battleship. £7 million reflects the relative value of this vessel.

3 *Battle cruiser* is a new ship which has some armour, but not as much as either battleship. The armour is well placed, however, to try to shield as many guns as possible from enemy shells. The ship has very heavy armament for its size (four 12in guns), but only half the secondary armament that battleships possess. The new design of turbine engines gives a top speed of 28 knots, making the battle cruiser the fastest ship in the fleet. The price of £8 million shows that it is really more valuable than an old battleship.

4 *Armoured cruiser* has well designed armour plating to shield as much of the ship's vital areas as possible. There are no 12in guns, but she still has a good main armament of four 8in guns as well as three 6in secondary guns. Being rather too

heavy for her size, the top speed is only 21 knots, not much faster than the battleships; so if caught unawares she can be sunk rather too easily. Good value for money at only £5 million!

5 *Light cruiser* is fast (25 knots) and easily sunk since she has no armour to speak of. There is no main armament but she does have six 6in guns which will be useful providing she can close the range sufficiently. 12in shells will cut through her decks as if through butter, and so you should keep her out of the main action if possible. The price is only £3 million.

The ranges for each gun type are as follows:

12in guns	Maximum range 20,000 yards
	Will penetrate thin armour at 16,000 yards
	Will penetrate everything at less than 8,000 yards
8in guns	Maximum range 15,000 yards
	Will penetrate thin armour at 10,000 yards
	Will penetrate everything at 4,000 yards
6in guns	Maximum range 10,000 yards
	Will penetrate thin armour at 5,000 yards
	Will penetrate everything at 1,500 yards

These armour penetration tables are only a guide. I have seen 12in shells bounce off a light cruiser at 10,000 yards, which is slightly unusual, and a lucky shot from a 6in gun helped sink a battleship at 7,000 yards!

The choice of ship is naturally very important, and the price of each ship shows – from experience – how the engagements tend to go.

For example, three light cruisers (£9 million) against one battle cruiser (£8 million) is pretty even. The light cruisers will have to close the range as fast as possible. Their speed is less than a battle cruiser's and so, if the battle cruiser decides to run away, the light cruisers will have a tough time. What tends to happen, though, is that the battle cruiser tries to bring its forward gun turrets to bear on the light cruisers to bring the maximum firepower against the enemy. In so doing, the battle cruiser will have to wear off her bearing and allow the light cruisers to close in.

Battleships, battle cruisers and armoured cruisers are the better classes of ship. Battle cruisers against an equal number of old battleships will generally result in the battle cruisers being victorious. Armoured cruisers will blow light cruisers out of the water if their 8in guns are accurate.

Try out your own choice of fleets. The initial money available is £100 million. This, I think, is too high and, when I play at home, we normally play with only £40 million in the bank for each player. Having decided on your choice, type the number (1–5) and press 'RETURN'.

Divisional position

As the fleets sight each other head on, you may choose whereabouts on the battlefield (or sea!) your fleet may arrive. Every ship must be given a divisional number from 1 to 9. 1 = far left, 2 = second from left, 3 = half left, 4 = just left of centre, 5 = in the centre and so on up to number 9 which is on the far right wing. Ships placed on the same division number automatically take position 1000 yards behind the ship in front. In that way, if you place all the ships in the same division, you will have a column in line ahead. If you give every ship a different number, you will have a line abreast formation. Type in your number and press 'RETURN'. The point of divisional numbers is that when you get to the orders stage, you can change course and speed of all ships in one division with just one order.

An important point to note is that the first ship typed in by each side is automatically the flagship. This will affect the screen layout (see below).

When you have finished building your fleet, type in the number 0 as a ship's name, and the next stage will be run in the program.

After both players have built their ships, the screen will clear and you will be asked for initial speeds.

Divisional checklist and speed input

The machine will run down the list of divisions to give you a lay-out of your ships and ask for the ordered speed in each division. The initial course is set at 90 (due east) for the

'Black' fleet and 270 (due west) for the 'White' fleet. This can be altered later, but at this point you must simply type in the speed of each division and then press 'RETURN'. If you choose a speed that is higher than the maximum for any ship, the ship will go no faster than its possible maximum speed.

After both fleets have displayed their ships on the divisional grid, you will be asked for the time that the fleets engage each other. This is only for information and plays no direct part in the game. Simply type in the hour followed by a comma and then the minutes past the hour. Press the 'RETURN' key.

Battle map display and orders

The layout of the respective ships will now be seen on the map as the leading ships catch sight of each other. Remember that the 'Black' fleet is sailing due east on to the map from the west, and the 'White' fleet is sailing due west on to the map from the east. As the battle begins, only the leading ships will be seen on the map. The remaining ships in the division are there, but are stretched out in line behind the leaders.

The display will show three types of graphic for each ship on the map. Firstly the ship's initial letter, then each ship's aspect (the approximate direction the ship is pointing) and then lastly the divisional number of each ship. This three-part display will keep turning while the instruction at the top tells you the current time and asks for a letter to be typed in. It does not matter who moves first since all calculations for movement and combat are simultaneous. So whichever player decides to start just presses the initial letter of the country. Do not press 'RETURN'.

After a few seconds, the top of the screen will clear, and you will be asked for the ship's initial letter or, if you wish to alter an entire division, the divisional number.

Individual ship

Press the initial letter of the ship you wish to give orders to. The ship's name, description, present course, present speed, maximum speed and armament layout will be shown at the right of the screen. The armament is shown as A1, A2, F2 and F1. A1 and F1 are the main guns still operational (aft and forward), while A2 and F2 are the secondary guns (aft and forward).

The following words will appear at the top of the screen: 'NEW SPEED (Y/N)?' Type 'N' for no speed alteration and 'Y' for a speed alteration. Do not press 'RETURN'. Next you will be asked for a 'NEW COURSE (Y/N)?' Again type either 'Y' or 'N'; if a new course is needed, type it in and press 'RETURN' when you've finished.

Division

Type not the letter of a ship but the number of the division instead. You will be given all the information of the lead ship.

If the message has been received by all the ships in the battle line, then the screen will show 'ORDERS RECEIVED . . .'

Since all the moves will happen simultaneously, you can order and reorder your ships or divisions any number of times in the same move. The movement calculations do not start to take effect until you press the space bar and then the screen will clear the top two lines.

Moves computation

The computer now works out exactly where the ships would move to in the course of one minute of game time. The ships will start to turn to their new directions (if you have ordered a change of course) and over four minutes will come round to their new heading. The computer displays the letters, aspects and divisional numbers four times – once for each minute – and then it is time to open fire.

Combat

This takes place at the end of every four-minute period. The screen will display each ship in order and give you its description, name and armament. The target can be any single ship of the enemy's. Owing to the relative simplicity at that time of gunnery control systems, the entire firepower of each ship (main and secondary) can only be directed against one other ship. Type in the target ship's initial letter. Do not press 'RETURN'.

As you type in the letter, so the machine will display the name of the target, the range in yards, the bearing in degrees and how many of your guns are able to bear upon it. This figure will depend on the number of guns you have intact, the range and, most importantly, the bearing of the target against your own direction. In order to get both 'fore' and 'aft' turrets bearing on the target, you must not have the target within 45 degrees of bow or stern. Firing at a target within 45 degrees of the bow will enable only your forward turrets to open fire, and, similarly, firing at a target within 45 degrees of your stern will enable only your aft turrets to bear.

That is why 'crossing the T', as it is called, is important tactics. To cross the enemy's line broadside on will enable you to bring all your guns to bear while the enemy can only fire half of his.

If no guns will bear or the target is out of range, the top of the screen will progress to the next ship opening fire. If you press a key which the computer does not recognise as a target, then it will display 'TARGET NOT FOUND'. If guns are able to bear upon the enemy, the 64 will calculate how many shells would have been on target over the four-minute period. Sometimes, at long ranges, only one or two will land in the target area. At other times, when the range is very short, numerous shells will find the range. To the right of the 'GUNS ABLE TO BEAR' numbers will appear the number of shells on target. If you have shells falling upon the enemy, then press any key to observe the results.

Ship damage display

The screen will clear and a standardised picture of the enemy ship will appear. As the shells fall upon the enemy, they may bounce off the armour if the range is long. They may be absorbed by armour plate (normally depicted by a 'sky hit'). They may miss altogether and plunge into the sea.

Shells reckoned to be hits will score 'hits' upon the enemy ship. If a main turret is hit, the description at the bottom of the screen will immediately alter its A1, A2, F2 and F1 numbers. This will also happen when a secondary gun is hit: these are marked on the ship by the graphic symbols 'above' characters '3' and '+'.

If funnels are hit, the speed will be reduced, and the information at the bottom of the screen altered.

If the masts are hit, you may not be able to send or receive signals by radio. This will only matter if you are off the board; then the ship will not answer any orders issued to it.

If the 'diamonds' are all hit, the ship will lose its steering capacity and will turn in random directions.

If the shells reach the waterline in the very middle of the ship, the target will explode with spectacular results (the 64 has good sound and graphics!).

Of course main armament has greater penetrating power than secondary armament, and the range is important. The shorter the range for that particular type of gun, the more likely the shell is to get through to the heart of the ship.

Once again, as all combat is simultaneous, it does not matter which ship 'goes first'. The computer will treat all losses and ship destructions as happening at the end of that particular combat phase. This is why, after a ship has been sunk, it will still be asking for firing orders in the same turn. It is deemed to have sunk only after the four minutes have elapsed.

When all ships have fired, the screen will display the map for a new set of orders.

General notes about the game

When ordering ships by division, always issue a complete new set of commands, otherwise ships in column may slow to a standstill!

The position of ships on the map is dependent on the relative positions of the two flagships. Ships off the map are still capable of firing and of receiving orders (provided their radio masts are intact). It is quite possible to send ships off the map to try to approach the enemy without being directly seen on the map. If your opponent has any sense, however, he will fire upon them off the map. There is no difference between a target off the map and one on the map. Only range and bearing affect gunnery results.

Since the layout on the map is centred upon the mid point between the two flagships, the map 'moves' to keep up with the action. If a flagship is sunk, the computer will take the last known position of the flagship as its central marker. If both fleets move off the map or all the enemy ships are sunk, play stops, and the amounts of shipping sunk by both sides (in millions of pounds) displayed at the top of the screen.

In general, just obey the instructions on the computer screen. All inputs with a 'flashing cursor' will require the 'RETURN' key after you have typed in the information. All inputs without a 'flashing cursor' do not require the 'RETURN' key to be pressed.

Tactical advice is easy! Use your speed if you are a battle cruiser. Use your greater firepower if you are a new battleship. If you have lots of cruisers, don't waste them in lone attacks, because they will be blown up by superior firepower. Send all the cruisers in a 'dog pack' to swamp the firepower of the superior target. Enough small ships should get through to shatter even the largest vessel providing the range is close (less than 5000 yards). Watch your bearings and try to time your turns so that you present the greatest firepower to the target.

If you are badly hit, try to limp off the map. A ship saved does not score anything to the opposition, no matter how badly you are damaged.

The program

Advice on programming

The program contains instructions, several REM lines and the 64's sound subroutines which can all be dropped if you are having trouble with memory shortages. Since I have never used all twenty-six ships in each fleet, the arrays can be redimensioned to a lower figure (say 10) to save further memory. The Commodore 64 should easily be able to accommodate a complete fleet.

Breakdown of listing

Lines	
3–93	Dimensions of multiple arrays
100–148	Main change of program
149–152	Battle picture layout
250–270	Subroutine to display ship picture
300–340	Subroutine to display shell falling and hit determination
341–499	Subroutine to calculate hit and damage results
500–599	Ship sunk display routine
5000–5995	Movement and orders subroutine
5000–5107	Map placement calculation and ship display on map
5110–5215	Input of country letter, ship letter and division number.
5220–5300	New orders input and information display
5500–5995	Calculation and display of ship movements for four minutes
6000–6499	Main firing and target calculations subroutine
6500–6998	Print instructions subroutine
7500–7590	Armour deflection and display
8000–8999	Divisional checklist and initial speed/course layout
9000–9195	Initial fleet building subroutine
10000–10999	Ship type picture data and initial specification data

15000–15990	Gunnery subroutine
15000–15320	Target range calculation
15400–15710	Guns able to bear and shells on target subroutine
15730–15990	Target display main chain and recalculation of map layout
20000–20090	Ship aspect display on map subroutine
25000–25410	Course alteration calculation subroutine
31000–31050	Clear top two lines subroutine
32000–32010	Maximum speed not exceeded check routine
33000–33070	End of game
60000–63930	64's sound code subroutine

The main variables used in this program are as follows. All matrix variables with dimensions of (1,25) refer to individual ships: the first figure applies to the fleet (0 = 'Black' and 1 = 'White') and the second to the ship number.

D$(1,25)	The picture of each ship on the damage and shell fall display expressed as five rows of three character figures. The initial data is stored in lines 10000–10999, but the string will change as damage alters the original data (as in line 355)
S(1,25)	Maximum speed in knots for each ship
A1(1,25)	Initial number of main armament turrets aft
F1(1,25)	Initial number of main armament turrets forward
A2(1,25)	Initial number of secondary armament turrets aft
F2(1,25)	Initial number of secondary armament turrets forward
A5(1,25)	Current main armament turrets aft during this combat phase
F5(1,25)	Current main armament turrets forward during this combat phase
A6(1,25)	Current secondary armament turrets aft during this combat phase

F6(1,25)	Current secondary armament turrets forward during this combat phase NB: The A1, F1, A2, F2 variables are 'updated' at the end of each combat phase to the same values as A5, F5, A6 and F6. This is to protect the 'simultaneous' firing of all ships (see lines 6095–6097)
BB(1,25)	Type of ship (1 = battleship, 4 = armoured cruiser, etc.). If this variable = 0, the ship has sunk
B5(1,25)	Temporary marker to see if the ship has sunk this move (see lines 6095–6097)
B(1,25)	Number of bridge command squares left on the ship. If = 0 then the ship is out of control
C(1,25)	Number of mast squares left on each ship. If = 0, ship may not receive orders off the map
N$(1,25)	Name of ship
BB$(1,25)	Description of type of ship
SS(1,25)	Current speed of ship in knots
SC(1,25)	Current course of ship in degrees
SO(1,25)	Ordered course for ship to follow in degrees
SX(1,25)	X coordinate of ship on a limitless grid
SY(1,25)	Y coordinate of ship on a limitless grid
SD(1,25)	Ship's division number from 1 to 9

The other main variables used in this program refer to the two fleets themselves and are expressed as a two-part matrix where 0 = 'Black' and 1 = 'White':

MM(1)	Amount of money in millions of pounds in the bank
MV(1)	Millions of pounds of enemy shipping sunk
NF$(1)	Name of fleet

Another matrix variable refers to the value of each ship. The data is given in line 7 and can be found as M9(X) where X is a number from 1 to 5.

Throughout the program there are a large number of temporary variables. Here are some of them:

G, G1, G2	used in screen POKE commands (see line 5)
C	temporary shorthand for variable C(1,25) and variable SC(1,25)

A1	temporary shorthand for variable A1(1,25)
A2	temporary shorthand for variable A2(1,25)
F1	temporary shorthand for variable F1(1,25)
F2	temporary shorthand for variable F2(1,25)
S	temporary shorthand for variable S(1,25)
B	temporary shorthand for variable B(1,25)
D$	temporary shorthand for variable D$(1,25)
X, Y	X and Y coordinates of falling shell as well as other uses elsewhere
PP	Number of ships in the same division
K7	Position on the screen POKE byte of the shell's next position
PK	Byte to be POKEd to screen at position K7
TH	Time in hours
TM	Time in minutes
R	Degrees to radians divisor
MN	Move number from 1 to 4 when calculating the four-minute move sequence
R2	Range to target in yards
RO	Bearing of target in degrees
D	Difference in bearing of target to direction of ship firing
B1	Number of main armament guns able to bear on target
B2	Number of secondary armament guns able to bear on target
H1	Number of main armament shells on target
H2	Number of secondary armament shells on target
D7	Byte to be POKEd to screen when displaying ship's aspect and direction

DREADNOUGHT

```
1 REM H.WALWYN
2 REM DREADNOUGHT
3 DIM A5(1,25),A6(1,25),F5(1,25),F6(1,25),B5(1,25)
4 GOSUB63900:NA=UV:NB=UH:NC=UW:NN=16:NG=80
5 G=US:G1=US+692:G2=US+80
6 POKEUV,0:GOSUB61100:GOSUB62100:GOSUB63100
7 M9(1)=10:M9(2)=7:M9(3)=8:M9(4)=5:M9(5)=3
8 FORI=0TO39:READD:DP$=DP$+CHR$(D):NEXTI
9 DATA 195,196,197,196,195,196,197,196,195,196,197,196,195,196,197,196,164,210
10 DATA 198,164,210,198,210,198,195,196,197,196,195,196,197,196,195,196,197,196
11 DATA 195,196,197,196
12 DIM D$(1,25),S(1,25),A1(1,25),F1(1,25),A2(1,25),F2(1,25),BB(1,25)
15 DIM MM(1),B(1,25),C(1,25),NF$(1),N$(1,25),BB$(1,25)
16 REM CURRENT SHIP VALUES ARE SS:SPEED,SC:COURSE,SO:ORDERED COURSE
17 DIM SS(1,25),SC(1,25),SO(1,25)
20 REM SX & SY ARE SHIPS POSITION.SD:   MV(1)=MONEY/VALUE OF SHIPS SUNK
21 DIM SX(1,25),SY(1,25),SD(1,25),MV(1)
31 MM(0)=100:MM(1)=100
91 POKEUG,U4:POKEUB,U3:PRINTUE$;"▙DO YOU WANT INSTRUCTIONS (Y/N) ?
92 GET A$:IF A$="" THEN 92
93 IF A$="Y" THEN GOSUB6500
100 REM FLEET AND SHIP NAMING AND BUILDING AT START OF GAME
```

```
101 GOSUB9000
110 REM INITIAL SET UPON MAP
111 GOSUB8000
120 REM DRAW MAP AND ACCEPT ORDERS
121 GOSUB5000
130 REM COMBAT
131 GOSUB6000
148 GOTO120
149 I=0:J=0
150 C=C(I,J)
151 A1=A1(I,J):A2=A2(I,J):F1=F1(I,J):F2=F2(I,J):S=S(I,J):B=B(I,J):D$=D$(I,J)
152 GOSUB250:GOSUB300
250 REM DRAW PICTURE
255 PRINTU4$;"▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒"DP$:POKEUG,U9
260 FOR X=0TO4:FOR Y=0TO14:POKEG1-40*X+Y,VAL(MID$(D$,3*(X*15+Y)+2,3))
265 POKEUC+692-40*X+Y,UF:NEXT Y,X
270 RETURN
300 GOSUB31000:GOSUB61100:PRINTU0$
301 IFH1>0ANDBB(I,J)<4THENPRINT"▒"R8$"12'' SHELLS ON "N$(K,L):BB=1:UM=3:GOTO307
302 IFH1>0ANDBB(I,J)>3THENPRINT"▒"R8$"8'' SHELLS ON "N$(K,L):BB=1:UM=1:GOTO307
303 IF H2>0 THEN PRINT"▒"R8$"6'' SHELLS ON "N$(K,L):BB=0:UM=2:GOTO307
306 RETURN
307 B5=1
308 Y=0:X=INT(RND(1)*30+5)
```

```
309 GOSUB61100:ONUMGOSUB61010,61020,61030
310 Y=Y+1:X=X+INT(RND(1)*3-1)
315 IF X<0 THEN X=0
316 IF X>38 THEN X=38
320 K7=G+X+40*Y
325 POKEUL,255-Y*10
330 IF PEEK(K7)=32 OR PEEK(K7)=46 THEN 360
335 PK=PEEK(K7)
336 IFPK>66ANDPK<70 THENGOSUB62100:GOSUB62010
337 IFPK>66ANDPK<70 THENPRINTU4$;"▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒"TAB(X)"V□▮X□▮X":GOTO359
338 IF PK=22 OR PK=86 THEN 359
340 IF PK=102 OR PK=64 THEN 370
341 REM DEFINITE HIT
342 IF PK=100 OR PK=70 OR PK=82 THEN 500
343 C9=3*((17-Y)*15+X-12)+2
344 IF PK=229 THEN S=S-4
345 IF PK=93 THEN C=C-1
346 IF PK=218 THEN B=B-1
347 IF PK=223 THEN A1=A1-1:POKE K7-1,102:C9=C9-3:C8=1
348 IF PK=233 THEN F1=F1-1:POKE K7+1,102:C9=C9+3:C8=1
349 IF PK=243 THEN A2=A2-1
350 IF PK=235 THEN F2=F2-1
351 IF PK=96 THEN 7500
352 GOSUB62100:GOSUB62020
```

```
354 POKE K7,102
355 D$=LEFT$(D$,C9-1)+"102"+RIGHT$(D$,LEN(D$)-C9-2):IFC8THENC8=0:PK=0:GOTO343
356 IF BB=1 AND B5=1 THEN B5=B5-1:GOTO370
359 GOTO400
360 POKE K7,46
370 GOTO310
400 PRINTU2$;"▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓"
405 IF S<6 THEN S=0
410 PRINT"▓GUNS:▓A1"A1"▓▓ ▓A2"A2"▓▓ ▓F2"F2"▓▓ ▓F1"F1"▓▓  MAX SPEED▓"S"▓ "
430 IF C=<0 THEN PRINT"▓ALL MASTS HIT.NO RADIO CONTACT POSSIBLE"
435 IF S<SS(K,L) THEN SS(K,L)=S
440 IF B=0 THEN PRINT"▓BRIDGE HIT!  NO LONGER UNDER CONTROL!  "
498 IF BB=1 THEN H1=H1-1:GOTO300
499 IF BB=0 THEN H2=H2-1:GOTO300
500 REM SUNK
505 GOSUB61100:GOSUB62100:GOSUB63100
510 GOSUB60100:FOR A=0TO7
512 PRINT"▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓                                    "
520 Y9=Y:X9=X
522 FOR UM=1TO25:POKEUH+7,UM:POKEUH+14,UM:NEXTUM
525 PRINTU0$;"▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓          B L O W N     U P  ! !     ▓"
530 FOR B=0TOINT(RND(1)*15)
540 POKE G+Y9*40+X9,42
550 X9=X9+INT(RND(1)*7-3):Y9=Y9-1
```

```
560 NEXT B,A
580 POKEUH+7,5:POKEUH+14,5
585 POKE NA,0
590 B5(K,L)=0
592 MV(I)=MV(I)+M9(BB(K,L))
599 RETURN
5000 POKEUG,U8:PRINT"▓"U8$:POKEUG,U4
5005 FORI=0TO25:POKEG2+I,42:POKEG2+840+I,42:POKEUC+I+80,8:POKEUC+920+I,8:NEXTI
5010 FOR I=0TO21:POKEUC+80+I*40,8:POKE UC+I*40+105,8
5015 POKE G2+I*40,42:POKE G2+I*40+25,42:NEXT I
5020 PRINTU5$;"▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓WEST(270) <--◆--> (90)EAST▓"
5030 REM FIND AVERAGE MAP PLACING BETWEEN OPPOSING FLAGSHIPS
5031 X5=INT((SX(0,0)+SX(1,0))/2):Y5=INT((SY(0,0)+SY(1,0))/2)
5035 X5=X5-12:Y5=Y5-10
5050 FOR N=1TO3:E9=1:FOR I=0TO1:E8=1:FOR J=0TO25
5060 IF BB(I,J)=0 THEN 5090
5065 E8=0
5070 IF INT(SX(I,J)-X5)<1 OR INT(SX(I,J)-X5)>=25 THEN 5090
5075 IF INT(SY(I,J)-Y5)<1 OR INT(SY(I,J)-Y5)>=21 THEN 5090
5078 E9=0
5080 G3=G2+INT(SX(I,J)-X5)+40*INT(SY(I,J)-Y5)
5081 IF N=3 THEN POKE G3,ASC(LEFT$(N$(I,J),1))-64+I*128
5082 IFN=2 THEN GOSUB20000:POKE G3,D7
5083 IF N<>1 THEN 5090
```

```
5085 POKE G3,SD(I,J)+48+I*128
5090 NEXT J:IF E8=1 THEN 33000
5092 NEXT I:IF E9=1 THEN 33000
5095 NEXT N
5100 PRINTU3$;"■FIRST LETTER OF COUNTRY? ■TIME="TH":"TM
5105 PRINT"IF FINISHED MANOEUVRES ,PRESS SPACE KEY"
5107 GOSUB63100:GOSUB63010
5110 GET A$:IF A$="" THEN 5010
5115 IF A$=" " THEN 5500
5120 FOR I=0TO1:IF A$=LEFT$(NF$(I),1) THEN 5150
5130 NEXT I:GOTO5010
5150 R9$="":IF I THEN R9$="■"
5160 GOSUB31000
5170 PRINTU8$;"■"R9$+NF$(I)+" FLEET"
5180 PRINT"INDIVIDUAL SHIP LETTER OR DIVISION NO.?"
5190 GET A$:IF A$="" THEN 5190
5200 A=ASC(A$):DV=0
5205 IF A>48 AND A<58 THEN DV=2:GOTO5220
5210 IF A>64 AND A<91 THEN 5220
5215 GOTO5170
5220 REM SHIP ASKED FOR
5221 GOSUB31000
5225 FOR J=0TO25:IFLEFT$(N$(I,J),1)=A$ AND BB(I,J)<>0 THEN 5230
5226 IF DV>0 AND BB(I,J)<>0 AND SD(I,J)=A-48 THEN5230
```

```
5227 NEXT J:IF DV=1 THEN PRINT"SORDERS RECEIVED FOR SHIPS IN DIV."A-48
5228 IF DV=1THEN FOR L=1TO1500:NEXT L:GOTO5000
5229 PRINTU7$;"SNO SUCH SHIP!":FOR L=1TO1500:NEXT L:GOTO5000
5230 IF DV=1 THEN SO(I,J)=SO:SS(I,J)=SS:GOSUB32000:GOTO5227
5231 IF DV=2 THEN DV=1:PRINT"SQ"R9$"DIVISION NO."A-48"LEAD SHIP......"
5232 PRINT"SQQ"TAB(26)R9$+N$(I,J);TAB(66)BB$(I,J):IF C(I,J)>0 THEN 5240
5233 IF INT(SX(I,J)-X5)<1 OR INT(SX(I,J)-X5)>=25 THEN 5237
5234 IF INT(SY(I,J)-Y5)<1 OR INT(SY(I,J)-Y5)>=21 THEN 5237
5235 GOTO 5240
5237 PRINTU7$;"S"R9$"OUT OF SIGHT AND RADIO INOPERATIVE"
5238 FOR L=1TO1500:NEXT L:GOTO5000
5240 PRINT"SQQQQQ"TAB(26)R9$+"COURSE  SPEED";TAB(66)SC(I,J)
5242 PRINT"SQQQQQ"TAB(74)SS(I,J)
5245 PRINT"SQQQQQQQ"TAB(34)R9$+"(MAX)";TAB(74)S(I,J)
5247 PRINTU7$;"SQQQQQQQQQQ"TAB(26)R9$+"A1"A1(I,J);TAB(66)"A2"A2(I,J)
5248 PRINTU7$;TAB(26)R9$+"F2"F2(I,J);TAB(66)"F1"F1(I,J)
5250 PRINTU8$
5251 PRINT"SNEW SPEED (Y/N)?"
5252 GET B$:IF B$="" THEN 5252
5255 IF B$="N" THEN 5270
5260 INPUT"SNEW SPEED.......";B$
5265 SS(I,J)=VAL(B$):SS=SS(I,J):IF SS(I,J)>S(I,J) THEN SS(I,J)=S(I,J)
5270 PRINT"S                                      "
5275 PRINT"SNEW COURSE (Y/N)?"
```

```
5280 GETB$:IFB$=""THEN 5280
5281 IF B$="N" THEN 5295
5282 INPUT"█NEW COURSE.......";B$
5285 SO(I,J)=VAL(B$)
5290 IF SO(I,J)>360 OR SO(I,J)<0 THEN 5270
5292 IF SO(I,J)=0 THEN SO(I,J)=360
5293 SO=SO(I,J)
5294 IF DV>0 THEN 5226
5295 GOTO5000
5300 REM DIVISION ASKED FOR
5500 REM MOVES & DISPLAY CALC. 1-3MINUTES OF TIME
5501 GOSUB31000
5503 FOR MN=1TO4
5505 TM=TM+1
5508 IF TM=60 THEN TM=0:TH=TH+1
5509 IF TH=24 THEN TH=0
5510 GOSUB31000
5511 PRINT"█MOVES COMPUTED ONE MINUTE AT A TIME"
5512 PRINT"███TIME:"TH":"TM;TAB(21)"MINUTE NO."MN
5514 FOR N7=1TOMN:GOSUB63100:GOSUB63030:
5515 FOR N9=1TO30:NEXT N9:NEXT N7:GOSUB63100:POKEUV,0
5520 FOR I=0TO1:FOR J=0TO25
5530 IF BB(I,J)=0 THEN 5590
5540 G3=G2+INT(SX(I,J)-X5)+40*INT(SY(I,J)-Y5)
```

```
5541 IF INT(SX(I,J)-X5)<1 OR INT(SX(I,J)-X5)>=25 THEN 5550
5542 IF INT(SY(I,J)-Y5)<1 OR INT(SY(I,J)-Y5)>=21 THEN 5550
5545 POKE G3,32
5550 GOSUB25000
5590 NEXT J,I
5595 R=57.2957795
5600 FOR I=0TO1:FOR J=0TO25
5610 IF BB(I,J)=0 THEN 5635
5615 IF B(I,J)>0 THEN 5620
5617 SO(I,J)=SO(I,J)+90*INT(RND(1)*2)-90*INT(RND(1)*2)
5618 IF SO(I,J)<1 THEN SO(I,J)=SO(I,J)+360
5619 IF SO(I,J)>360 THEN SO(I,J)=SO(I,J)-360
5620 SX(I,J)=SX(I,J)+SIN(SC(I,J)/R)*SS(I,J)/30
5630 SY(I,J)=SY(I,J)-COS(SC(I,J)/R)*SS(I,J)/30
5635 NEXT J,I
5640 REM FIND AVERAGE MAP PLACING BETWEEN OPPOSING FLAGSHIPS
5641 X5=INT((SX(0,0)+SX(1,0))/2):Y5=INT((SY(0,0)+SY(1,0))/2)
5645 X5=X5-12:Y5=Y5-10
5650 FOR N=1TO3:FOR I=0TO1:FOR J=0TO25
5660 IF BB(I,J)=0 THEN 5690
5665 IF INT(SX(I,J)-X5)<1 OR INT(SX(I,J)-X5)>=25 THEN 5690
5667 IF INT(SY(I,J)-Y5)<1 OR INT(SY(I,J)-Y5)>=21 THEN 5690
5670 G3=G2+INT(SX(I,J)-X5)+40*INT(SY(I,J)-Y5)
5672 IF N=3 THEN POKE G3,ASC(LEFT$(N$(I,J),1))-64+I*128
```

```
5674 IFN=2 THEN GOSUB20000:POKE G3,D7
5676 IF N<>1 THEN 5690
5678 POKE G3,SD(I,J)+48+I*128
5690 NEXT J,I,N
5700 REM END OF TURN
5720 NEXT MN
5995 RETURN
6000 REM COMBAT
6005 GOSUB31000
6020 FOR J=0TO25:FOR I=0TO1
6030 IF BB(I,J)=0 THEN 6090
6035 IF A1(I,J)=0 AND A2(I,J)=0 AND F1(I,J)=0 AND F2(I,J)=0 THEN 6090
6055 GOSUB31000
6060 R9$="":IF I THEN R9$="▚"
6065 PRINTU8$;"▚"R9$+BB$(I,J)" FIRING...TARGET? (0=NONE)"
6067 GOSUB63100:GOSUB63020
6070 PRINTR9$+N$(I,J)+"■▒";
6072 PRINTU7$;R9$+"A1"A1(I,J)" A2"A2(I,J)" F2"F2(I,J)" F1"F1(I,J)
6074 GET A$:IF A$<>""THEN 6074
6075 GET A$:IF A$=""THEN 6075
6076 IF A$="0"THEN 6090
6077 K=1:IF I=1 THEN K=0
6078 FOR L=0TO25:IF A$=LEFT$(N$(K,L),1)AND B5(K,L)<>0 THEN 6100
6080 NEXT L
```

```
6085 GOSUB31000
6086 PRINTU7$;"▚TARGET NOT FOUND!   "A$" ???":FOR LL=1TO1500:NEXT LL
6090 NEXT I,J
6095 FOR I=0TO1:FOR J=0TO25
6096 A1(I,J)=A5(I,J):A2(I,J)=A6(I,J):F1(I,J)=F5(I,J):F2(I,J)=F6(I,J)
6097 BB(I,J)=B5(I,J):NEXT J,I
6098 RETURN
6100 X=ABS(SX(I,J)-SX(K,L)):Y=ABS(SY(I,J)-SY(K,L)):R1=SQR(X*X+Y*Y)
6110 R2=INT(R1*1000)
6120 GOSUB15000
6125 GOSUB31000:GOTO6090
6500 PRINTU7$;"▚   D R E A D N O U G H T
6510 PRINTU0$;"    ____________________________
6520 PRINTUE$;"▚▚IN THIS GAME ,TWO FLEETS ENGAGE EACH
6530 PRINT"OTHER DURING THE YEARS 1895-1918.
6540 PRINT"▚THE BLACK FLEET START OFF AT THE LEFT
6545 PRINT"(WEST) OF THE BOARD AND THE ▚WHITE■ AT
6547 PRINT"THE RIGHT (EAST).
6548 PRINT"▚AT THE START (YOU CAN INPUT THE TIME),
6549 PRINT"FLEETS ARE SAILING TOWARDS EACH OTHER."
6550 PRINT"▚FIRSTLY BUILD YOUR FLEETS...
6552 PRINT"▚THERE ARE 5 TYPES TO CHOOSE FROM VARYING";
6554 PRINT"IN COST IN MILLIONS OF POUNDS .YOU HAVE
6555 PRINT"100 MILLION TO START.
```

```
6556 PRINT"EACH SHIP HAS ARMOUR (MORE OR LESS - IT
6557 PRINT"DEPENDS ON THE TYPE) AND SOME ARE FASTER";
6558 PRINT"▓▓PRESS ANY KEY■"
6559 GET A$:IF A$=""THEN 6559
6560 PRINT"▙YOU HAVE TO PLACE EACH SHIP INTO A LINE
6562 PRINT"DIVISION FROM 1-9. 1 IS ON YOUR LEFT,
6564 PRINT"5 IS APPROX CENTRE AND 9 IS YOUR RIGHT.
6566 PRINT"▓ONCE BATTLE IS JOINED YOU MAY MOVE YOUR
6568 PRINT"SHIPS IN DIVISION OR INDEPENDENTLY.
6570 PRINT"▓THE BATTLE AREA IS APPROX 21000 YARDS SQ";
6572 PRINT"AND EACH BATTLE TURN IS 4 MINUTES LONG."
6573 PRINT"EACH 'SQUARE' IS 1000 YDS SQUARE.
6574 PRINT"  THE PLACING ON THE MAP DEPENDS ON THE";
6575 PRINT"RELATIVE PLACING OF OPPOSING FLAGSHIPS,"
6576 PRINT"SO THE MAP 'MOVES' TO KEEP UP WITH THEM.";
6578 PRINT"(THE FIRST SHIP BUILT IS THE FLAGSHIP).
6580 PRINT"▓IF A FLAGSHIP IS SUNK THEN IT'S PLACING
6582 PRINT"IS IT'S PLACE OF SINKING.
6584 PRINT"ORDERS MAY BE ISSUED TO SHIPS OFF THE
6586 PRINT"MAP IF THEIR RADIO COMMUNICATION IS OK!"
6590 PRINT"▓ONCE ALL SHIPS ARE OFF THE MAP THEN
6592 PRINT"THE FLEETS LOSE SIGHT OF EACH OTHER AND
6594 PRINT"THE ENGAGEMENT ENDS.
6596 PRINT"▓PRESS ANY KEY"
```

```
6597 GET A$:IF A$="" THEN 6597
6998 RETURN
6999 INPUT"TRIAL";A$:PRINTA$:END
7500 REM ARMOUR COMPUTATION
7510 IF H1>0 AND BB(I,J)<4 THEN RA=20000/R2:GOTO7550
7520 IF H1>0 AND BB(I,J)>3 THEN RA=15000/R2/2:GOTO7550
7530 IF H2>0 THEN RA=10000/R2/3
7550 RA=RA/(6-BB(K,L))
7552 RA=RA*RND(1)*3.5:IF RA>1THEN 354
7555 PRINT"▓▓A R M O U R     D E F L E C T I O N  !"
7557 X6=INT(RND(1)*2)*-2+1
7560 GOSUB63100:GOSUB63030:FOR Z4=1 TO INT(RND(1)*5+8)
7570 X=X+X6:Y=Y-1:IF Z4>6 THEN Y=Y+1
7575 K7=G+X+40*Y
7580 POKE K7,46:NEXT Z4
7590 GOSUB63100:GOTO310
8000 FOR I=0TO1
8002 R9$="":IFI=1 THEN R9$="▓"
8005 PRINT"▙"U8$;R9$;NF$(I)" FLEET.
8010 FOR K=1TO9:KK=1
8020 PRINTU7$;"▒▒▒▒▒▒▒▒▒▒▒▒DIVISION NO."K"▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒"
8030 FOR J=0TO25:IFSD(I,J)<>KTHEN 8040
8035 KK=0:PRINTU8$;R9$;N$(I,J);TAB(12)BB$(I,J);TAB(24)"MAX SPEED:"S(I,J)
8040 NEXT J:PRINTU7$;"▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒
```

```
8045 IF KK=1 THEN 8100
8050 IF I THEN 8055
8052 PRINTU8$;"YOU ARE IN LINE AHEAD AT LEFT OF SCREEN
8053 PRINT"AND STEERING DUE EAST (90 DEGREES)
8054 GOTO8060
8055 PRINTU8$;"YOU ARE IN LINE AHEAD AT RIGHT OF SCREEN";
8056 PRINT"& STEERING TOWARDS ENEMY DUE WEST (270)
8060 INPUT "SPEED IN KNOTS";S
8070 PP=0:FOR J=0TO25:IF SD(I,J)<>K THEN 8090
8078 PP=PP+1:SS(I,J)=S
8080 IF S>S(I,J) THEN SS(I,J)=S(I,J)
8081 IF I THEN 8085
8082 SY(I,J)=K*2+.5+RND(1)/10:SX(I,J)=2-PP+31
8083 SC(I,J)=90:SO(I,J)=90:GOTO8090
8085 SY(I,J)=(10-K)*2+0.5:SX(I,J)=23+PP+31
8086 SC(I,J)=270:SO(I,J)=270
8090 NEXT J
8100 NEXT K,I
8200 PRINTU5$;"␣AT WHAT TIME DO THE FLEETS ENGAGE ?
8210 INPUT"■HOURS,MINUTES";TH,TM
8999 RETURN
9000 POKEUB,U0:POKEUG,UF:PRINTU3$;"␣PLEASE NAME YOUR FLEETS TAKING PART.";U8$
9010 INPUT"■FLEET NUMBER 1 (BLACK)";NF$(0)
9020 A$=LEFT$(NF$(0),1)
```

```
9030 INPUT"■FLEET NUMBER 2 (WHITE)■";NF$(1)
9040 IFLEFT$(NF$(1),1)=A$ THEN PRINT"■ANOTHER INITIAL LETTER PLEASE.":GOTO9030
9045 FOR I=0TO1
9047 R9$="":IF I THEN R9$="■"
9050 PRINT"␣"R9$+NF$(I)" FLEET
9055 J=0
9060 PRINT"______________________________________
9070 PRINT"TYPE IN NAME OF SHIP (MAX 10 LETTERS)
9080 IF I THEN 9090
9085 INPUT"(TYPE '0' IF FINISHED)";A$
9087 GOTO9100
9090 INPUT"(TYPE '0' IF FINISHED)■";A$
9100 PRINTA$:IF A$="0" THEN 9190
9105 FOR K=0TOJ:IF LEFT$(A$,1)=LEFT$(N$(I,K),1) THEN 9110
9107 NEXT K:GOTO9120
9110 PRINT"■PLEASE CHOOSE ANOTHER INITIAL LETTER":GOTO9070
9120 REM OK
9130 N$(I,J)=LEFT$(A$,10)
9133 PRINT"■MONEY AVAILABLE IS"MM(I)"MILLION POUNDS."
9135 PRINT"◆◆◆◆◆◆◆◆◆◆◆◆◆◆◆◆◆◆◆◆◆◆◆◆◆◆◆◆◆◆◆◆◆◆◆◆◆◆◆◆
9140 PRINT"              MAX      MAIN   2ND     $
9141 PRINT"NO.   TYPE    SPEED    GUNS   GUNS    $
9142 PRINT"◆◆◆◆◆◆◆◆◆◆◆◆◆◆◆◆◆◆◆◆◆◆◆◆◆◆◆◆◆◆◆◆◆◆◆◆◆◆◆◆
9145 PRINT" 1:BATTLESHIP   20      5-12''   6     10
```

```
9146 PRINT" 2:OLD B/SHIP    18       3-12''  6      7
9147 PRINT" 3:BATTLE/CRSR  28       4-12'' 3   10 8
9148 PRINT" 4:ARMD/CRSR    21       4-8''   3      5
9149 PRINT" 5:LIGHT/CRSR   25         0     6      3
9169 PRINT"◆◆◆◆◆◆◆◆◆◆◆◆◆◆◆◆◆◆◆◆◆◆◆◆◆◆◆◆◆◆◆◆◆◆◆◆◆◆◆◆
9170 INPUT"NO. / TYPE";A
9175 IF MM(I)-M9(A)<0 THEN PRINT"■NOT ENOUGH MONEY - TRY AGAIN!":GOTO9070
9177 BB(I,J)=A:MM(I)=MM(I)-M9(A)
9180 ON A GOSUB10000,10200,10100,10300,10400
9181 PRINT"■DIVISIONAL POSITION IN BATTLE AREA:1-9"
9182 PRINT"(1:FAR LEFT  - 5:CENTRE -  9:FAR RIGHT)"
9183 IF I=0 THEN PRINT"STEAMING IN LINE AHEAD DUE EAST.
9184 IF I=1 THEN PRINT"STEAMING IN LINE AHEAD DUE WEST.
9185 INPUT"DIVISION NUMBER FOR SHIP. ( 1-9)";A$
9186 SD(I,J)=VAL(A$):J=J+1:GOTO9060
9190 NEXT I
9195 RETURN
10000 REM DESIGNS
10005 REM BATTLESHIP 0
10007 D$="*"
10010 D$=D$+"095160160186186186186186186186186186186160105"
10011 D$=D$+"032064223243160243186186186186160160235233064"
10012 D$=D$+"032032032064223218243160160235235233064032032"
10013 D$=D$+"032032032096096229093229218233064096096032032"
10014 D$=D$+"032032096096096096229093229096096096096032032"
10020 D$(I,J)=D$:S(I,J)=20:B(I,J)=2:C(I,J)=2:B5(I,J)=1
10025 A1(I,J)=2:F1(I,J)=3:F2(I,J)=3:A2(I,J)=3
10026 A5(I,J)=2:F5(I,J)=3:F6(I,J)=3:A6(I,J)=3
10028 BB$(I,J)="BATTLESHIP"
10030 RETURN
10100 REM BATTLE/CRSR
10107 D$="*"
10110 D$=D$+"032095160160160186186186186186186186160105032"
10111 D$=D$+"032064223218243186186186186186186235233064032"
10112 D$=D$+"032032064223243229229229093218233064032032032"
10113 D$=D$+"032032032096032229229229093032032096032032032"
10114 D$=D$+"032032032096032096032096032096096096032032032"
10120 D$(I,J)=D$:S(I,J)=28:B(I,J)=2:C(I,J)=3:B5(I,J)=3
10125 A1(I,J)=2:F1(I,J)=2:F2(I,J)=1:A2(I,J)=2
10126 A5(I,J)=2:F5(I,J)=2:F6(I,J)=1:A6(I,J)=2
10128 BB$(I,J)="BATTLE/CRSR"
10130 RETURN
10200 REM OLD B/SHIP
10207 D$="*"
10210 D$=D$+"032095160160186186186186186186186186160105032"
10211 D$=D$+"032032064223243243218235235235032233064032032"
10212 D$=D$+"032032032032243229032229218233064032032032032"
10213 D$=D$+"032032096032096229032229093032096032032032032"
```

```
10214 D$=D$+"032032032096096032096096032096032096032032032"
10220 D$(I,J)=D$:S(I,J)=18:B(I,J)=2:C(I,J)=1:B5(I,J)=2
10225 A1(I,J)=1:F1(I,J)=2:F2(I,J)=3:A2(I,J)=3
10226 A5(I,J)=1:F5(I,J)=2:F6(I,J)=3:A6(I,J)=3
10228 BB$(I,J)="OLD B/SHIP"
10230 RETURN
10300 REM ARMD/CRSR
10307 D$="*"
10310 D$=D$+"032032095160160186186186186186186186160105032"
10311 D$=D$+"032032064223160243218186186235160032233064032"
10312 D$=D$+"032032032064223229093229218235233064032032032"
10313 D$=D$+"032032032032096229093229096032096032032032032"
10314 D$=D$+"032096032096032096096096032096032096032032032"
10320 D$(I,J)=D$:S(I,J)=21:B(I,J)=2:C(I,J)=2:B5(I,J)=4
10325 A1(I,J)=2:F1(I,J)=2:F2(I,J)=2:A2(I,J)=1
10326 A5(I,J)=2:F5(I,J)=2:F6(I,J)=2:A6(I,J)=1
10328 BB$(I,J)="ARMD/CRSR"
10330 RETURN
10400 REM LIGHT/CRSR
10407 D$="*"
10410 D$=D$+"032032095160160186186186186186186186160105032"
10411 D$=D$+"032032032243160243218186186160235032235032032"
10412 D$=D$+"032032032032243229093229218235032032032032032"
10413 D$=D$+"032032032032096229093229229032032032032032032"
```

```
10414 D$=D$+"032032032032032032032096032096032032032032032"
10420 D$(I,J)=D$:S(I,J)=25:B(I,J)=2:C(I,J)=2:B5(I,J)=5
10425 A1(I,J)=0:F1(I,J)=0:F2(I,J)=3:A2(I,J)=3
10426 A5(I,J)=0:F5(I,J)=0:F6(I,J)=3:A6(I,J)=3
10428 BB$(I,J)="LIGHT/CRSR"
10430 RETURN
10999 RETURN
15000 PRINTU3$;"▆▆▆▆"TAB(26)"TARGET"
15010 PRINTTAB(26)"‾‾‾‾‾‾"
15020 R8$="":IF K=1 THEN R2$="▆"
15030 PRINTTAB(26)R8$+N$(K,L)
15040 PRINT"▆"TAB(26)R8$+"RANGE";TAB(66)R2"YDS"
15050 RO=(SX(K,L)-SX(I,J))/(SY(I,J)-SY(K,L)):RO=ATN(RO)*R
15060 IF SY(I,J)>SY(K,L) THEN 15100
15070 RO=RO+180
15080 GOTO15200
15100 IF RO<0 THEN RO=RO+360
15110 GOTO15200
15200 PRINT"▆"TAB(26)R8$+"BEARING";TAB(66)INT(RO)"DEGREES"
15300 IF R2>20000 THEN PRINTU7$;"▆"TAB(26)R8$+"OUT OF";TAB(66)"RANGE":GOTO15900
15305 IF A1(I,J)=0 AND A2(I,J)=0 AND F2(I,J)=0 AND F1(I,J)=0 THEN 15900
15310 IF A1(I,J)=0 AND F1(I,J)=0 AND R2>10000 THEN R2=21000:GOTO15300
15320 IF BB(I,J)>3 AND R2>15000 THEN R2=21000:GOTO15300
15400 REM GUNS CALC
```

```
15405 A=INT(R0):C=SC(I,J)
15410 D=ABS(R0-C)
15420 IF D<30 THEN 15510
15425 IF D>29 AND D<151 THEN 15570
15430 IF D>150 AND D<210 THEN 15540
15433 IF D>209 AND D<331 THEN 15570
15435 IF D>330 THEN 15510
15510 B1=F1(I,J):B2=F2(I,J):GOTO15600
15540 B1=A1(I,J):B2=A2(I,J):GOTO15600
15570 B1=A1(I,J)+F1(I,J):B2=A2(I,J)+F2(I,J):GOTO15600
15600 IF R2>10000 THEN B2=0
15605 PRINT"▣"TAB(26)R8$+"GUNS ABLE";TAB(66)"TO BEAR..."
15610 PRINTTAB(26)R8$+"MAIN:"B1;TAB(66)"SCND:"B2
15650 IF B1+B2=0 THEN 15900
15652 PRINT
15655 FOR B=1TO7:GOSUB62100:GOSUB62020:POKEUV,8-B:POKEUH,B*30+10
15660 FOR A=1TO12:NEXTA:PRINTTAB(26)R9$+"         ";TAB(66)"      "
15665 FOR A=1TO14:NEXTA:PRINTU1$;"◫◫"TAB(26)R8$+"SHELLS ON";TAB(66)"TARGET◫◫"
15670 NEXT B
15675 H1=B1*20000/R2*(RND(1)*.5+0.5)
15676 IF BB(I,J)>3THEN H1=H1*.7
15678 H2=B2*10000/R2*(RND(1)*.5+0.5):H2=INT(H2):IFH2>30 THEN H2=30
15679 H1=INT(H1):IF H1>30 THEN H1=30
15680 PRINTU7$;"◫◫◫"TAB(34)R8$;H1;TAB(74)H2
```

```
15690 IF H1+H2=0 THEN 15900
15700 A1=A5(K,L):A2=A6(K,L):F1=F5(K,L):F2=F6(K,L):S=S(K,L):B=B(K,L):C=C(K,L)
15710 D$=D$(K,L)
15730 PRINTU3$;"▣"R8$"PRESS ANY KEY TO OBSERVE SHELL HITS  "
15735 GET A$:IF A$="" THEN 15735
15750 GOSUB250
15760 GOSUB300
15770 GOSUB61100
15780 PRINTUF$;"▣"R8$"PRESS ANY KEY TO RETURN TO THE MAP   "
15785 GET A$:IF A$="" THEN 15785
15790 GOSUB62100:GOSUB63100
15800 A5(K,L)=A1:A6(K,L)=A2:F5(K,L)=F1:F6(K,L)=F2:S(K,L)=S:B(K,L)=B:C(K,L)=C
15810 D$(K,L)=D$:POKEUG,U8
15835 PRINT"▙":POKEUG,U4:FORX=0TO25:POKEG2+X,42:POKEG2+840+X,42:POKEUC+80+X,8
15836 POKE UC+920+X,8:NEXT X:FORX=0TO21:POKEG2+X*40,42:POKEG2+25+X*40,42
15837 POKE UC+X*40+80,8:POKEUC+X*40+105,8:NEXT X
15838 PRINTU5$;"▣◫◫◫◫◫◫◫◫◫◫◫◫◫◫◫◫◫◫◫◫◫◫◫◫WEST(90) <--◆--> (270)EAST▣"
15840 REM FIND AVERAGE MAP PLACING BETWEEN OPPOSING FLAGSHIPS
15841 X5=INT((SX(0,0)+SX(1,0))/2):Y5=INT((SY(0,0)+SY(1,0))/2)
15845 X5=X5-12:Y5=Y5-10
15850 FOR X=0TO1:FOR Y=0TO25
15860 IF BB(X,Y)=0 THEN 15890
15865 IF INT(SX(X,Y)-X5)<1 OR INT(SX(X,Y)-X5)>=25 THEN 15890
15867 IF INT(SY(X,Y)-Y5)<1 OR INT(SY(X,Y)-Y5)>=21 THEN 15890
```

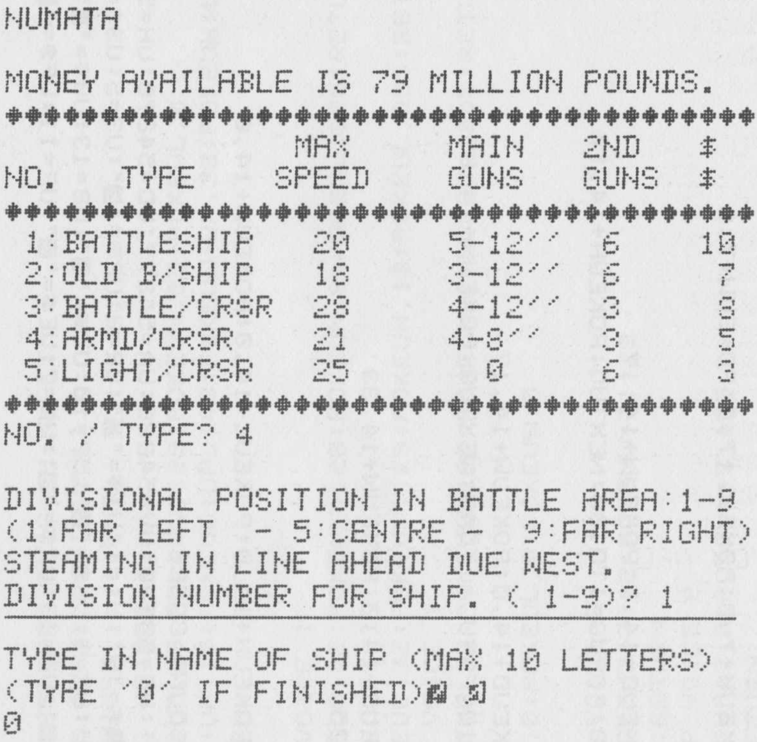
```
15870 G3=G2+INT(SX(X,Y)-X5)+40*INT(SY(X,Y)-Y5)
15872 POKE G3,ASC(LEFT$(N$(X,Y),1))-64+X*128
15890 NEXT Y,X
15895 GOTO15990
15900 PRINTU8$;"▮"R8$+"PRESS ANY KEY WHEN READY TO CONTINUE   "
15905 GET A$:IF A$="" THEN15905
15906 PRINT:PRINT
15910 FOR RO=1TO17
15920 PRINTTAB(26)"       "
15930 NEXT RO
15990 RETURN
20000 IF SC(I,J)>337 OR SC(I,J)<23 THEN D7=I*128+93
20010 IF SC(I,J)>157 AND SC(I,J)<203 THEN D7=I*128+93
20020 IF SC(I,J)>22 AND SC(I,J)<68 THEN D7=I*128+78
20030 IF SC(I,J)>202 AND SC(I,J)<248 THEN D7=I*128+78
20040 IF SC(I,J)>67 AND SC(I,J)<113 THEN D7=I*128+67
20050 IF SC(I,J)>247 AND SC(I,J)<293 THEN D7=I*128+67
20060 IF SC(I,J)>112 AND SC(I,J)<158 THEN D7=I*128+77
20070 IF SC(I,J)>292 AND SC(I,J)<338 THEN D7=I*128+77
20090 RETURN
25000 REM COURSE STEER
25005 W3=0
25010 O=SO(I,J):C=SC(I,J)
25015 IF C=O THEN SC(I,J)=SO(I,J):RETURN
```

```
25020 IF C-O>0 THEN A=1
25030 IF C-O<0 THEN A=2
25035 IF ABS(C-O)>=180 AND A=1 THEN A=2:O=O+360:W3=-1:GOTO25100
25040 IF ABS(C-O)>=180 AND A=2 THEN A=1:O=O-360:W3=1:GOTO25100
25100 ON A GOTO 25200,25300
25200 C=C-30
25210 IF C<=O THEN C=O
25215 IF C<=0 THEN C=360+C
25220 GOTO25400
25300 C=C+30
25310 IF C>=O THEN C=O
25315 IF C>360 THEN C=C-360
25320 GOTO25400
25400 SO(I,J)=O+W3*360:SC(I,J)=C
25410 RETURN
31000 REM CLEAR TOP TWO LINES
31010 PRINT"▮                      "
31020 PRINT"▮▮                      "
31050 RETURN
32000 IF SS(I,J)>S(I,J) THEN SS(I,J)=S(I,J)
32010 RETURN
33000 GOSUB31000
33010 PRINT"▮OPPOSING FLEETS LOSE TOUCH WITH EACH
33020 PRINT"OTHER AT ▮"TH;TM
```

```
33030 FOR LL=1TO1500:NEXT LL
33040 GOSUB31000
33050 PRINT"▣TOTAL VALUE OF SHIPS SUNK BY EACH FLEET
33060 PRINT"IS "NF$(0);MV(0)" & "R9$;NF$(1);MV(1)
33070 PRINT"THANKYOU AND GOOD NIGHT....":END
60100 REM SHIP BLOWS UP - ALL 3 VOICES
60110 POKEUV,15:POKEUA,253:POKEUD,63:POKEUW,129:POKEUH,20:POKEUL,0
60120 FORUP=7TO14 STEP7:POKEUA+UP,15:POKEUD+UP,143:POKEUW+UP,33:POKEUH+UP,5
60130 POKEUL+UP,UP:NEXTUP:RETURN
61000 REM SOUND COMMODORE 64
61010 REM SET UP 8" SHELL FOR VOICE 1
61015 POKEUV,15:POKEUA,221:POKEUD,32:POKEUW,129:POKEUH,9:POKEUL,255:RETURN
61020 REM SET UP 6" SHELL FOR VOICE 1
61025 POKEUV,15:POKEUA,205:POKEUD,32:POKEUW,129:POKEUH,13:POKEUL,255:RETURN
61030 REM SET UP 12" SHELL FOR VOICE 1
61035 POKEUV,15:POKEUA,221:POKEUD,32:POKEUW,129:POKEUH,7:POKEUL,255:RETURN
61100 REM CANCEL VOICE 1
61105 POKEUA,0:POKEUD,0:POKEUH,0:POKEUL,0:POKEUW,0
61110 RETURN
62010 REM SET UP SHELL HIT SEA VOICE 2
62015 POKEUV,15:POKEUA+7,154:POKEUD+7,12:POKEUW+7,129
62017 POKEUH+7,140:POKEUL+7,20:RETURN
62020 REM SET UP SHELL HIT SHIP VOICE 2
62025 POKEUV,15:POKEUA+7,9:POKEUD+7,0:POKEUW+7,129
62027 POKEUH+7,34:POKEUL+7,0:RETURN
```

```
62100 REM CANCEL VOICE 2
62105 POKEUA+7,0:POKEUD+7,0:POKEUH+7,0:POKEUL+7,0:POKEUW+7,0
62110 RETURN
63010 REM TWOTONE VOICE 3
63015 POKEUV,6:POKEUA+14,11:POKEUD+14,0:POKEUW+14,17
63017 POKEUH+14,12:POKEUL+14,50:FORUQ=1TO100:NEXTUQ:POKEUH+14,17
63018 RETURN
63020 REM HIGH PEEP VOICE 3
63025 POKEUV,7:POKEUA+14,41:POKEUD+14,0:POKEUW+14,17
63027 POKEUH+14,100:POKEUL+14,10:FORUQ=1TO40:NEXTUQ:POKEUH+14,65
63029 RETURN
63030 REM TIME PEEP VOICE 3
63035 POKEUV,9:POKEUA+14,5:POKEUD+14,0:POKEUW+14,33
63037 POKEUH+14,150:POKEUL+14,35
63039 RETURN
63100 REM CANCEL VOICE 3
63105 POKEUA+14,0:POKEUD+14,0:POKEUH+14,0:POKEUL+14,0:POKEUW+14,0
63110 RETURN
63900 REM COMMODORE 64 COLOUR/SOUND CODES
63902 US=1024:UC=55296:UG=53281:UB=53280:UV=54296:UA=54277:UD=54278:UH=54273
63905 UL=54272:UW=54276:U0=0:U0$="■":U1=1:U1$="▣":U2=2:U2$="▣":U3=5:U3$="▣"
63910 U4=6:U4$="▣":U5=8:U5$="▣":U6=9:U6$="◩":U7=10:U7$="⊠":U8=13:U8$="█"
63915 U9=14:U9$="▣":UU=4:UU$="▨":UR=12:UR$="◪":UE=7:UE$="▣":UF=11:UF$="⊠"
63930 RETURN

READY.
```

Examples of play



```
NUMATA

MONEY AVAILABLE IS 79 MILLION POUNDS.
########################################
                   MAX     MAIN   2ND  $
NO.   TYPE       SPEED     GUNS   GUNS $
########################################
 1:BATTLESHIP     20     5-12''   6   10
 2:OLD B/SHIP     18     3-12''   6    7
 3:BATTLE/CRSR    28     4-12''   3    8
 4:ARMD/CRSR      21     4-8''    3    5
 5:LIGHT/CRSR     25       0      6    3
########################################
NO. / TYPE? 4

DIVISIONAL POSITION IN BATTLE AREA:1-9
(1:FAR LEFT  - 5:CENTRE -  9:FAR RIGHT)
STEAMING IN LINE AHEAD DUE WEST.
DIVISION NUMBER FOR SHIP. ( 1-9)? 1
_______________________________________

TYPE IN NAME OF SHIP (MAX 10 LETTERS)
(TYPE '0' IF FINISHED)▣ ▣
0
```

To show you how it all works, I shall play through a trial Russian-Japanese encounter to simulate part of the famous battle of Tsushima. I shall play the Japanese, and my opponent (Black) will play the Russian Empire.

He has already made his choice of fleet and has built up:

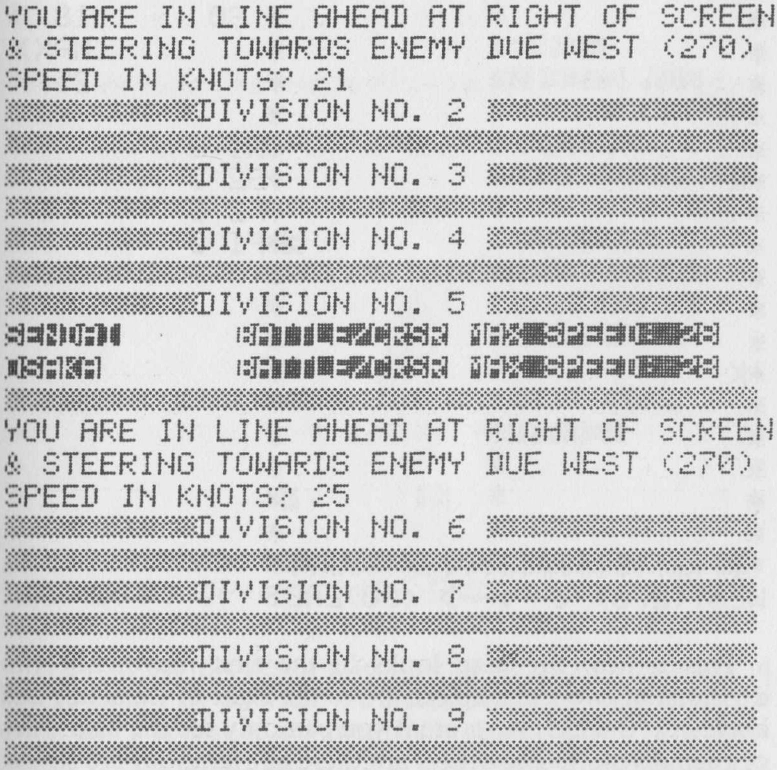
Rostov	Old battleship in division 4
Tsarina	Old battleship in division 4
Volga	Old battleship in division 4 plus two light cruisers
Kirkov	Light cruiser in division 7
Mezen	Light cruiser in division 7

I have built a fleet that costs nearly the same as his. In fact it is £1 million cheaper! But my fleet is all modern built:

Sendai	Battle cruiser in division 5
Osaka	Battle cruiser in division 5

Minato	Armoured cruiser in division 1
Numata	Armoured cruiser in division 1

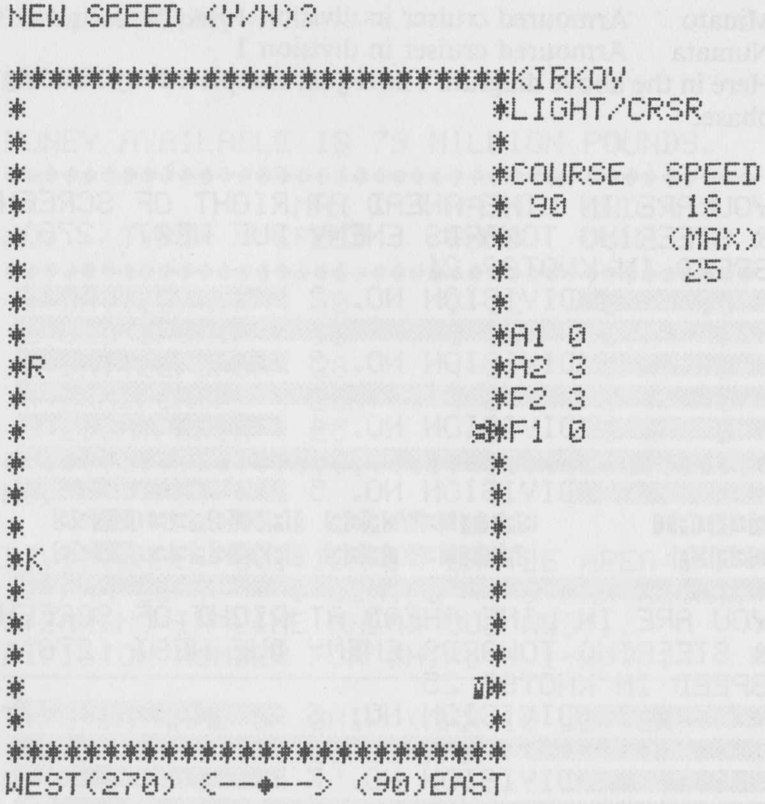
Here in the above diagram I have just completed my building phase.



```
YOU ARE IN LINE AHEAD AT RIGHT OF SCREEN
& STEERING TOWARDS ENEMY DUE WEST (270)
SPEED IN KNOTS? 21
DIVISION NO. 2

DIVISION NO. 3

DIVISION NO. 4

DIVISION NO. 5
[illegible]        [illegible] [illegible]
[illegible]        [illegible] [illegible]

YOU ARE IN LINE AHEAD AT RIGHT OF SCREEN
& STEERING TOWARDS ENEMY DUE WEST (270)
SPEED IN KNOTS? 25
DIVISION NO. 6

DIVISION NO. 7

DIVISION NO. 8

DIVISION NO. 9
```

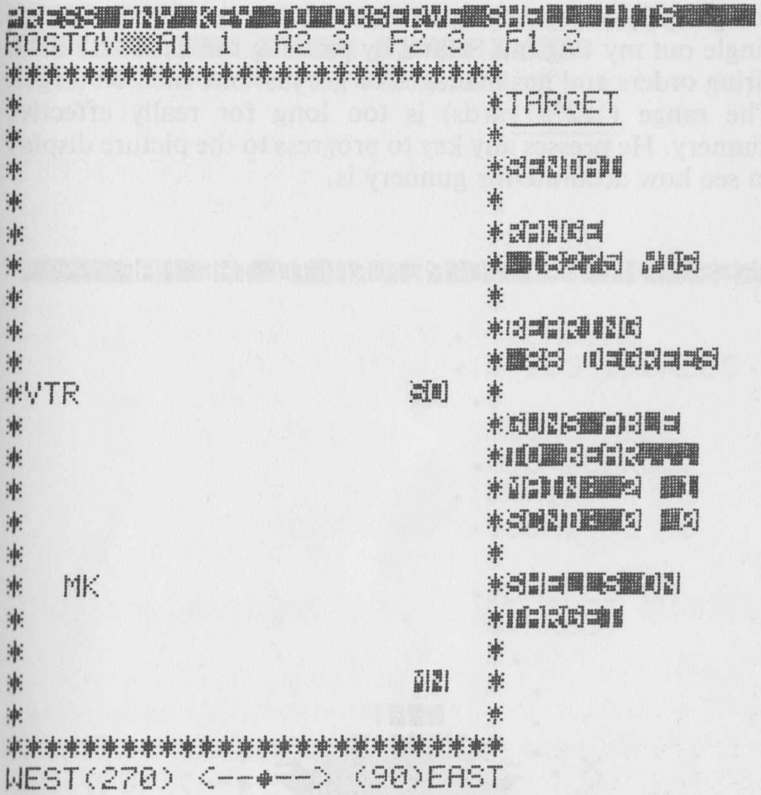
During the divisional checklist phase, I have ordered my armoured cruisers to steam at 21 knots, their maximum speed, and therefore have ordered my battle cruisers to steam at 25 knots – not their maximum speed, otherwise they would get too far ahead of my cruisers.

Both fleets are heading straight for each other as battle opens. I, being the 'White' fleet, am coming in from the east, and the Russians are arriving from the west.



```
NEW SPEED (Y/N)?

**************************KIRKOV
*                        *LIGHT/CRSR
*                        *
*                        *COURSE    SPEED
*                        * 90        18
*                        *          (MAX)
*                        *           25
*                        *
*                        *A1 0
*R                       *A2 3
*                        *F2 3
*                       S*F1 0
*                        *
*                        *
*                        *
*K                       *
*                        *
*                        *
*                        *
*                       M*
*                        *
**************************
WEST(270) <--*--> (90)EAST
```

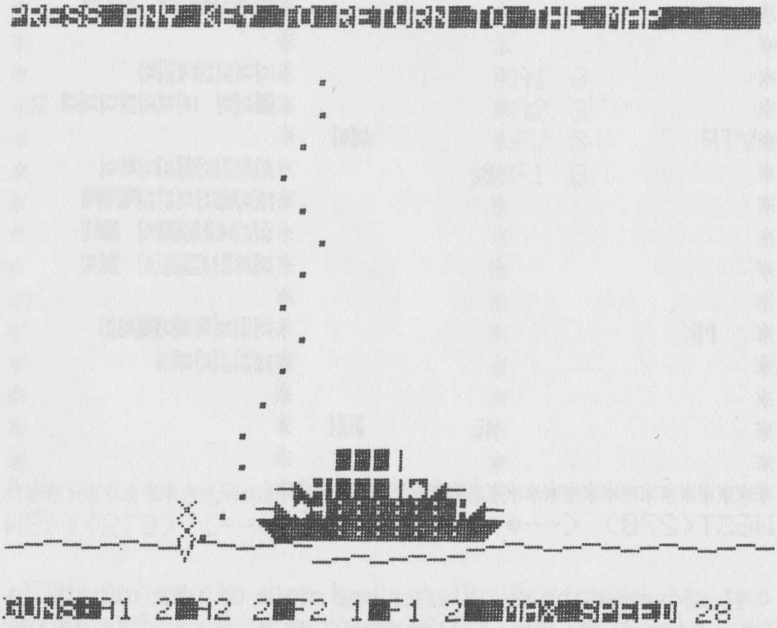
This is how the map looks in the first move. My two divisions of two ships apiece are to the right of the map, and his are on the left. At present you can only see the lead ships of each division. The others are there all right, but are strung out behind the lead ships. Being off the map makes no difference to the ships' operational abilities and their targetability. Here, the Russian light cruiser Kirkov is about to increase speed to maximum to try to close the range with my armoured cruiser Minato (the letter M in reverse field to the bottom right of the map).



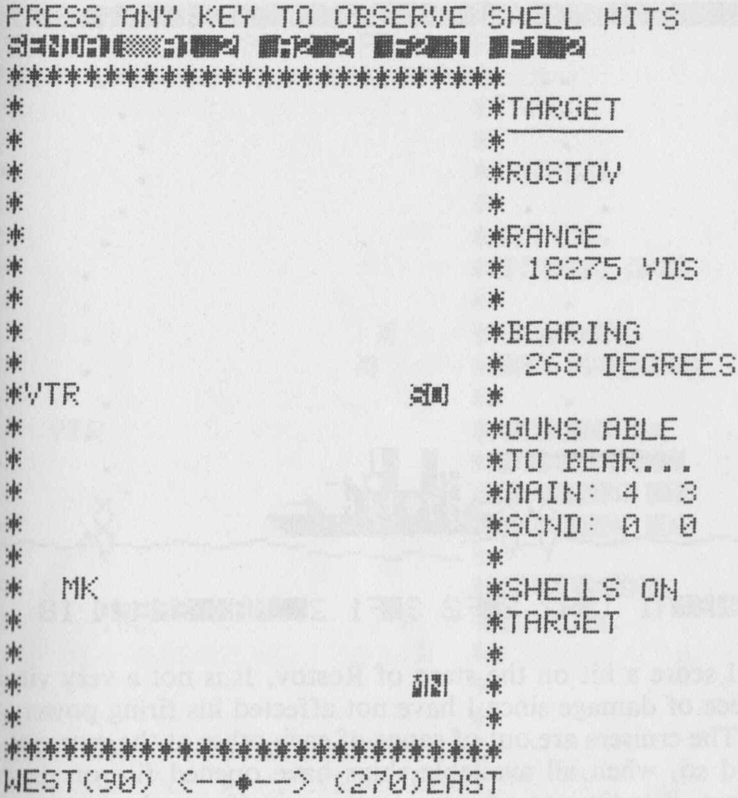
```
ROSTOV▒A1 1  A2 3  F2 3  F1 2
******************************
*                            *TARGET
*                            *
*                            *
*                            *
*                            *
*                            *
*                            *
*                            *
*                            *
*VTR                         *
*                            *
*                            *
*                            *
*                            *
*                            *
*   MK                       *
*                            *
*                            *
*                            *
*                            *
******************************
WEST(270) <--+--> (90)EAST
```

Here we see the result after one move of four minutes in 'game time'. By now all the fleets' ships are visible on the map, and it is time to advance to the combat phase. The main battle fleet (battle cruisers and old battleships) are in the middle of the map and steering towards each other. The cruisers are to the south, and already my orders to the Japanese fleet have taken effect. I have ordered all my ships to steer roughly north-west (300), and while the range is closing, my ships are able to bring most of their guns to bear. The enemy is coming straight at me, while I am steering at an oblique angle towards him.

Now the Russian fleet is opening fire. The flagship Rostov can only bring its forward guns to bear. This means the enemy only has two main guns firing at me, while the range is too great for secondary armament. He has sensibly decided to single out my flagship Sendai by pressing the letter 'S' in his firing orders and has managed to get just one shell on target. The range (18275 yards) is too long for really effective gunnery. He presses any key to progress to the picture display to see how accurate his gunnery is.

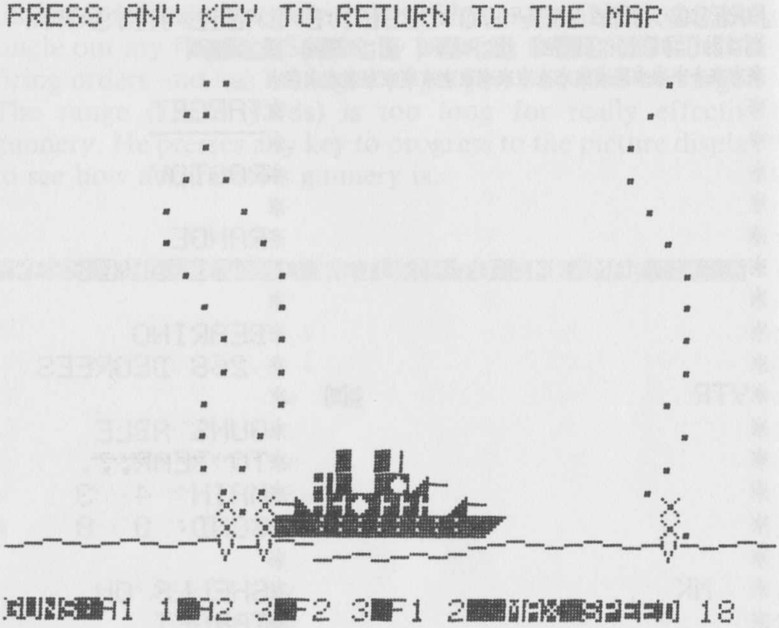


And there we see his one 12in shell miss by a few yards. The Sendai is still intact. His gunnery has not really affected me – even though he has three ships to my two. Now it is my time to open fire on the Russian flagship with all my guns able to bear.



```
PRESS ANY KEY TO OBSERVE SHELL HITS
SENDAI
**************************
*                        *TARGET
*                        *
*                        *ROSTOV
*                        *
*                        *RANGE
*                        * 18275 YDS
*                        *
*                        *BEARING
*                        * 268 DEGREES
*VTR                     *
*                        *GUNS ABLE
*                        *TO BEAR...
*                        *MAIN: 4  3
*                        *SCND: 0  0
*                        *
*  MK                    *SHELLS ON
*                        *TARGET
*                        *
*                        *
*                        *
**************************
WEST(90) <--*--> (270)EAST
```

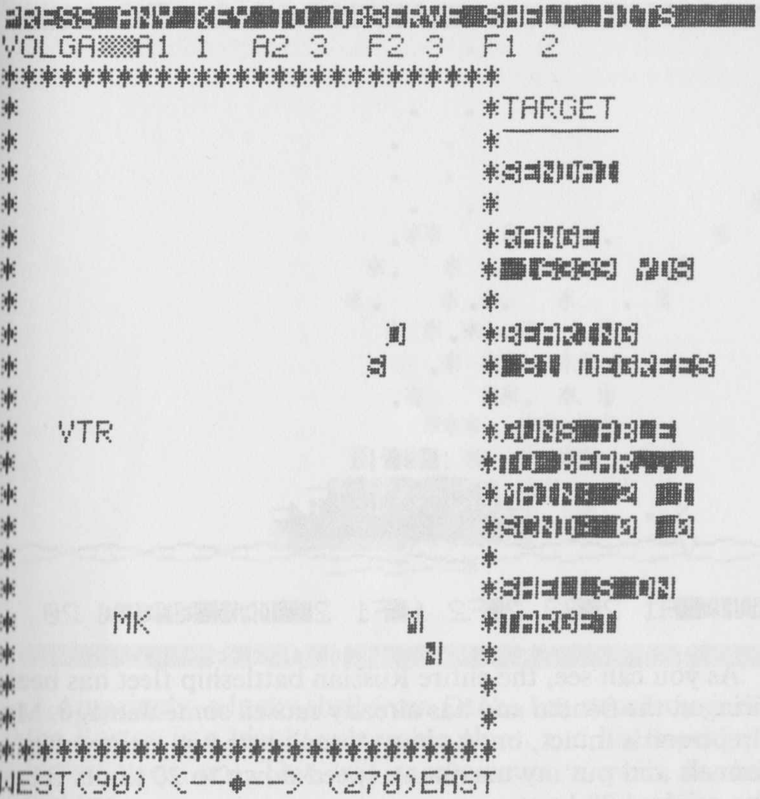
The Sendai fires back at the Rostov and succeeds in getting three 12in shells on target.



```
PRESS ANY KEY TO RETURN TO THE MAP

GUNS A1 1 A2 3 F2 3 F1 2 [illegible] 18
```

I score a hit on the stern of Rostov. It is not a very vital piece of damage since I have not affected his firing power.

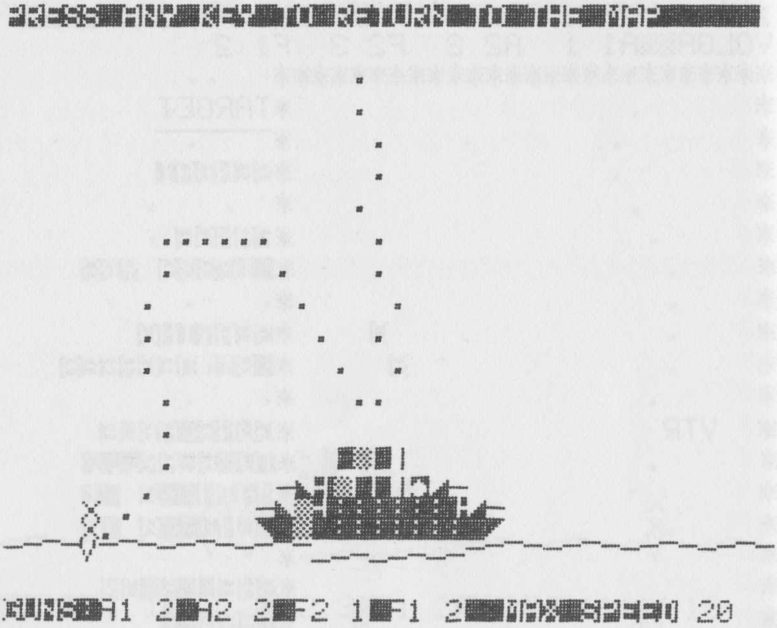
The cruisers are out of range of each other at the moment, and so, when all available ships have opened fire on each other, it is time to advance to the next ‘four-minute move’ sequence of orders.



```
PRESS ANY KEY TO OBSERVE SHELL HITS
VOLGA▒▒A1 1  A2 3  F2 3  F1 2
******************************
*                           *TARGET
*                           *
*                           *SENDAI
*                           *
*                           *RANGE
*                           *[illegible] YDS
*                           *
*                    [illegible]    *BEARING
*                   [illegible]     *[illegible] DEGREES
*                           *
*   VTR                     *GUNS ABLE
*                           *TO BEAR
*                           *[illegible]
*                           *[illegible]
*                           *
*                           *SHELLS ON
*      MK              [illegible]  *TARGET
*                       [illegible] *
*                           *
*                           *
******************************
WEST(90) <--•--> (270)EAST
```

In the orders phase, I have placed all my ships in a north–south line (360), and the enemy, still determined to close the range, is coming on straight at me. I should be able to pick him off with my superior gunnery.

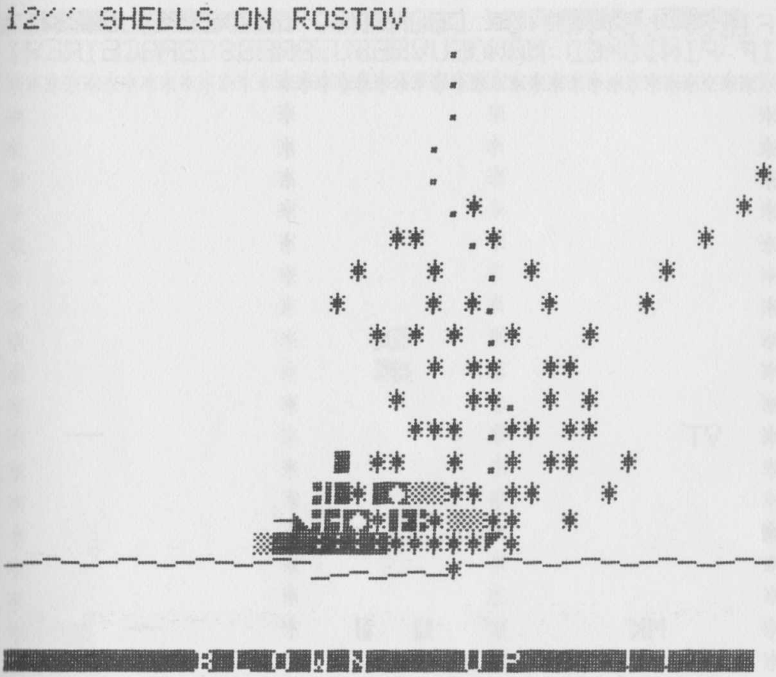
Here the Volga is opening fire on my flagship again. He can only bring two guns to bear, and only one of them has succeeded in landing on target.



```
PRESS ANY KEY TO RETURN TO THE MAP
GUNS A1 2 A2 2 F2 1 F1 2 MAX SPEED 20
```

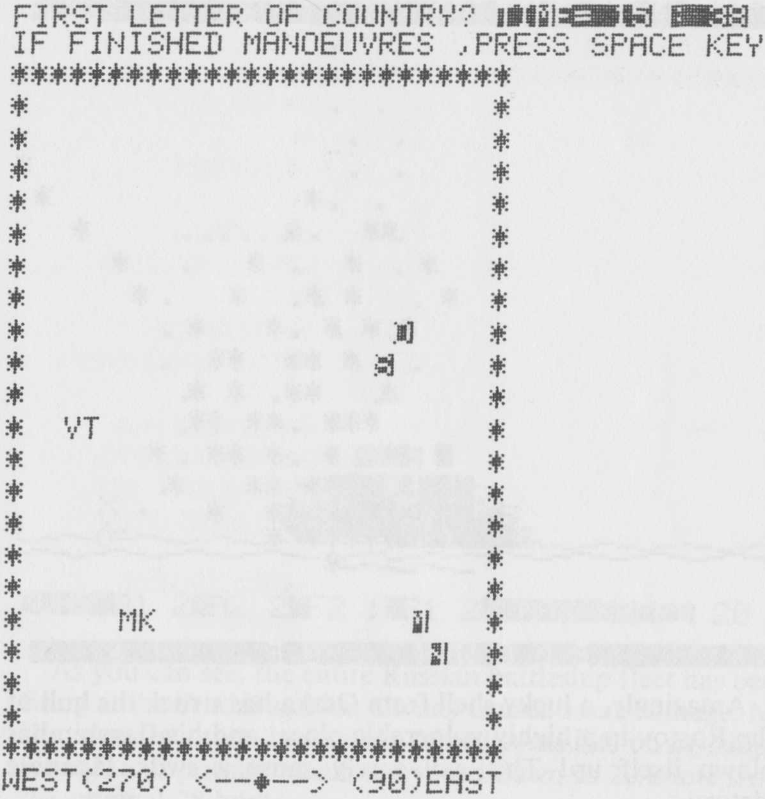
As you can see, the entire Russian battleship fleet has been firing at the Sendai and has already caused some damage. My firepower is intact, but he has scored some hits on my ship's funnels and put my maximum speed down to 20 knots from the original 28 knots.

However, the one shell from the Volga has 'bounced off' my armour because of the range. Now it is my turn to fire back at the Russian fleet: the flagship Rostov has already suffered damage from the Sendai and Osaka.



```
12´´ SHELLS ON ROSTOV

BLOWN UP
```

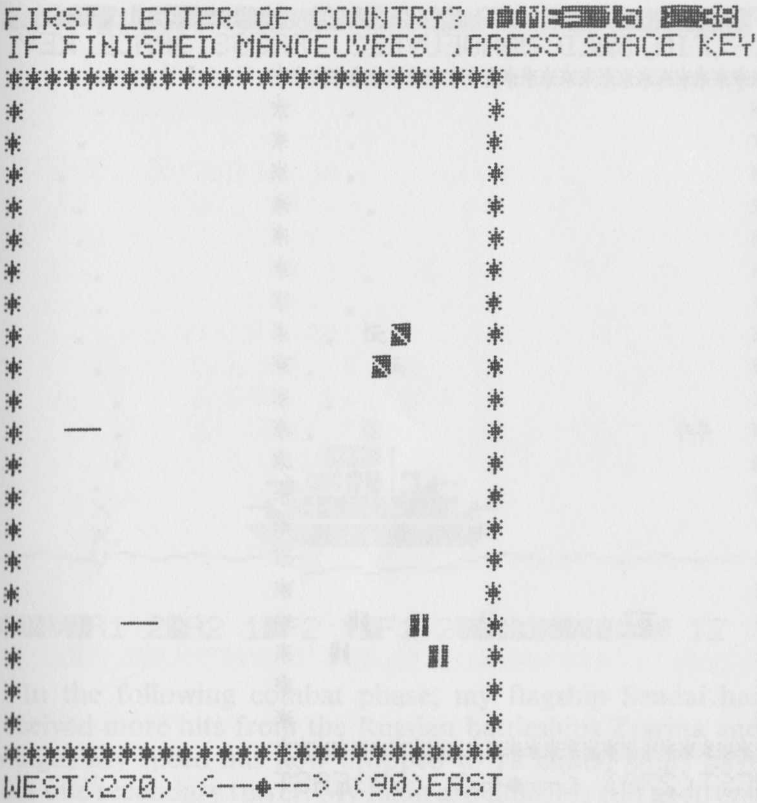
Amazingly, a lucky shell from Osaka has struck the hull of the Rostov in a highly vulnerable place, and his flagship has blown itself up! This will surely cause a swift Japanese victory.



```
FIRST LETTER OF COUNTRY?
IF FINISHED MANOEUVRES ,PRESS SPACE KEY
**************************
*                        *
*                        *
*                        *
*                        *
*                        *
*                        *
*                        *
*                   ▮    *
*                  ▮     *
*                        *
*  VT                    *
*                        *
*                        *
*                        *
*                        *
*                        *
*     MK             ▮   *
*                     ▮  *
*                        *
*                        *
**************************
WEST(270) <--+--> (90)EAST
```

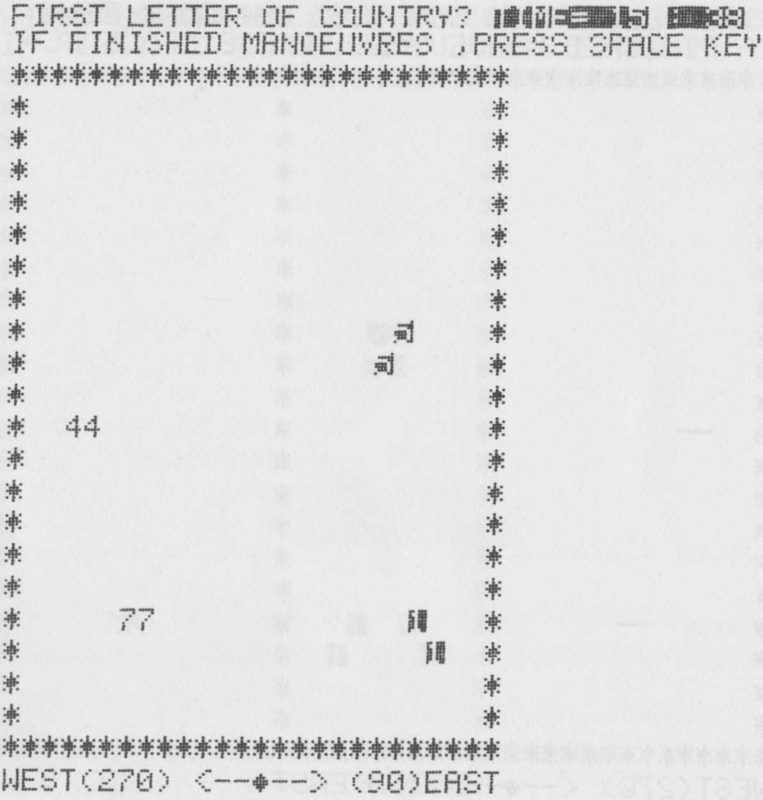
Only eight minutes have passed since the opposing fleets caught sight of each other, and the display before our next move shows exactly the same layout as the last map diagram except that the Rostov (R) is no longer on the board! Before we both make our next move I shall pause to show you how the 64 displays our ships. There are three different displays which are repeated until one of us presses a letter (the initial letter of our respective country) to proceed to the next lot of orders.

Firstly the computer displays the individual ships' letters as above.



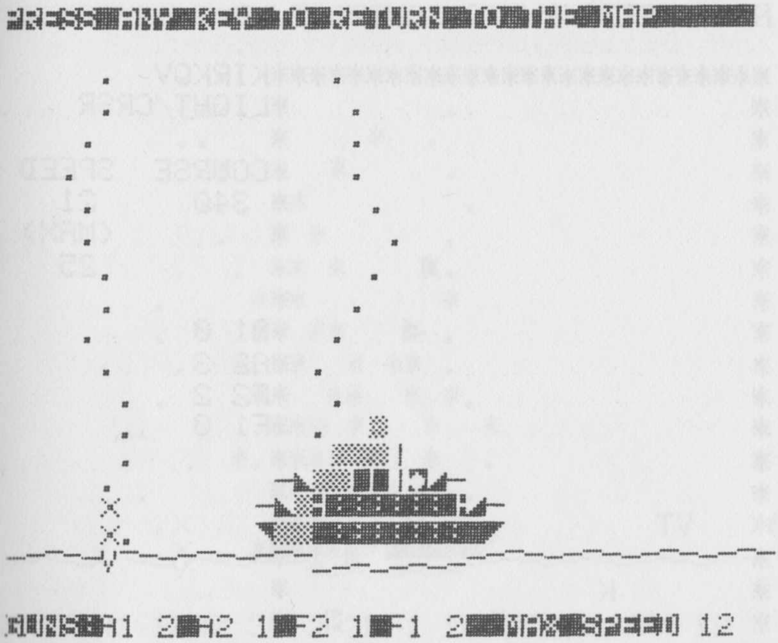
```
FIRST LETTER OF COUNTRY?
IF FINISHED MANOEUVRES ,PRESS SPACE KEY
**************************
*                        *
*                        *
*                        *
*                        *
*                        *
*                        *
*                        *
*                   ▨    *
*                  ▨     *
*                        *
*   —                    *
*                        *
*                        *
*                        *
*                        *
*                        *
*      —             ▌   *
*                     ▌  *
*                        *
*                        *
**************************
WEST(270) <--*-->(90)EAST
```

The second display shows the ships' aspects – the approximate directions that the vessels are steering. The Russian fleet is steaming due east in two divisions. The Japanese cruiser division (at the bottom right) are steaming in a northerly direction, while my two battle cruisers are heading northwest. Since the 64 graphics can display only eight direction characters, the aspect of each ship is correct to within 22.5 degrees of its true heading. Even so, it is very useful to be able to see not only the name of each ship, but also the approximate course being followed.



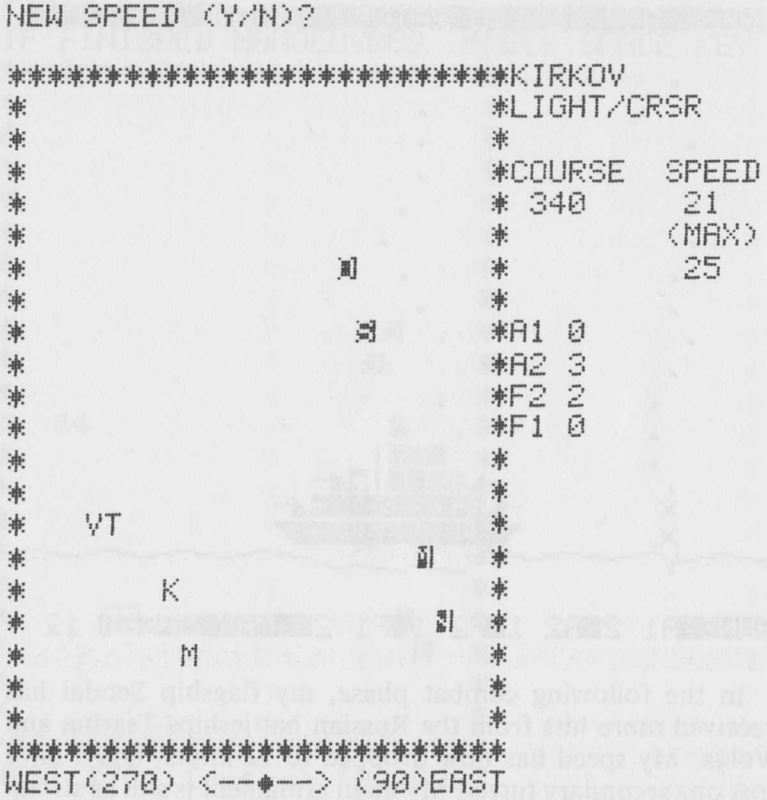
```
FIRST LETTER OF COUNTRY?
IF FINISHED MANOEUVRES ,PRESS SPACE KEY
**************************
*                        *
*                        *
*                        *
*                        *
*                        *
*                        *
*                        *
*                        *
*                        *
*                        *
*  44                    *
*                        *
*                        *
*                        *
*                        *
*                        *
*    77                  *
*                        *
*                        *
*                        *
**************************
WEST(270) <--◆-->(90)EAST
```

The third display on the map shows the divisional number of each ship. This is purely to remind the players of the divisional orders should they wish to move ships by divisions.



```
PRESS ANY KEY TO RETURN TO THE MAP

GUNS A1 2 A2 1 F2 1 F1 2 SPEED 12
```

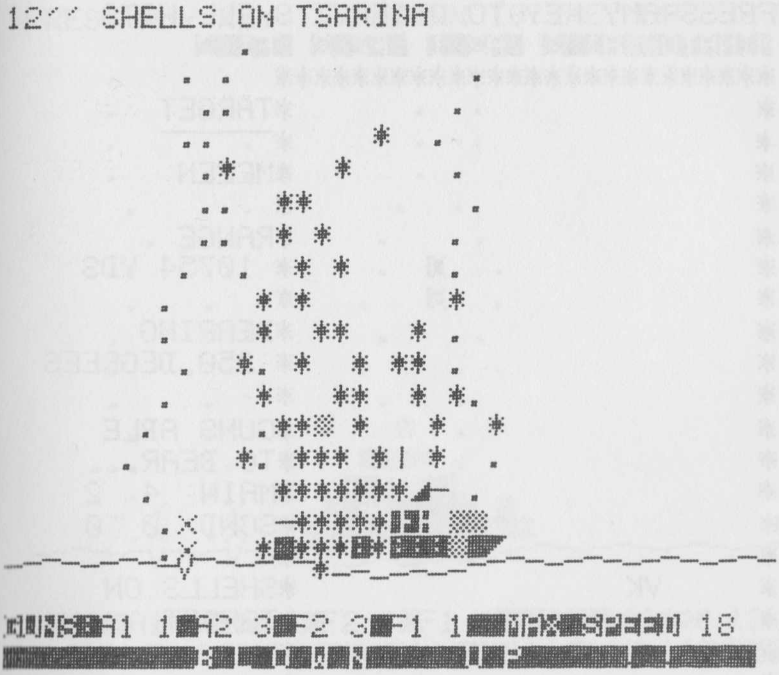
In the following combat phase, my flagship Sendai has received more hits from the Russian battleships Tsarina and Volga. My speed has now dropped to 12 knots, and I have lost one secondary turret. My main armament is still as strong as ever.



```
NEW SPEED (Y/N)?

**************************KIRKOV
*                        *LIGHT/CRSR
*                        *
*                        *COURSE  SPEED
*                        * 340     21
*                        *        (MAX)
*                ▣       *         25
*                        *
*                 ▣      *A1  0
*                        *A2  3
*                        *F2  2
*                        *F1  0
*                        *
*                        *
*   VT                   *
*                    ▣   *
*       K                *
*                     ▣  *
*        M               *
*                        *
*                        *
**************************
WEST(270) <--*--> (90)EAST
```

The Russian light cruiser Kirkov has been ordered northwards to try to draw the fire away from the two remaining battleships. I have now ordered my two armoured cruisers Minato and Numata to turn away to the south-east and try to cut off the light cruiser Mezen.

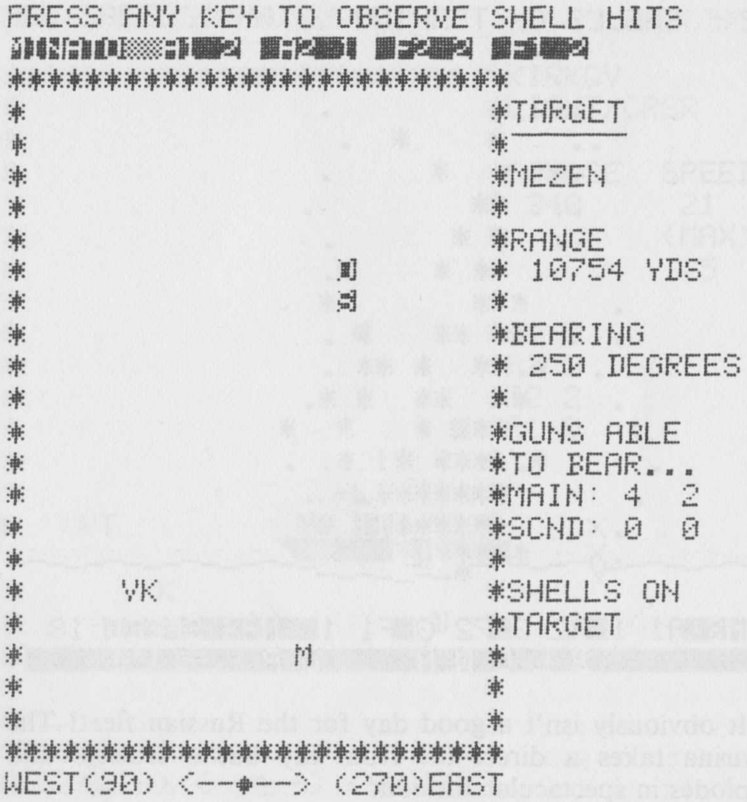
His battleships are heading southwards, while my battle cruisers have changed course to the west to bring all their guns to bear on the next Russian target, Tsarina.



```
12'' SHELLS ON TSARINA
```

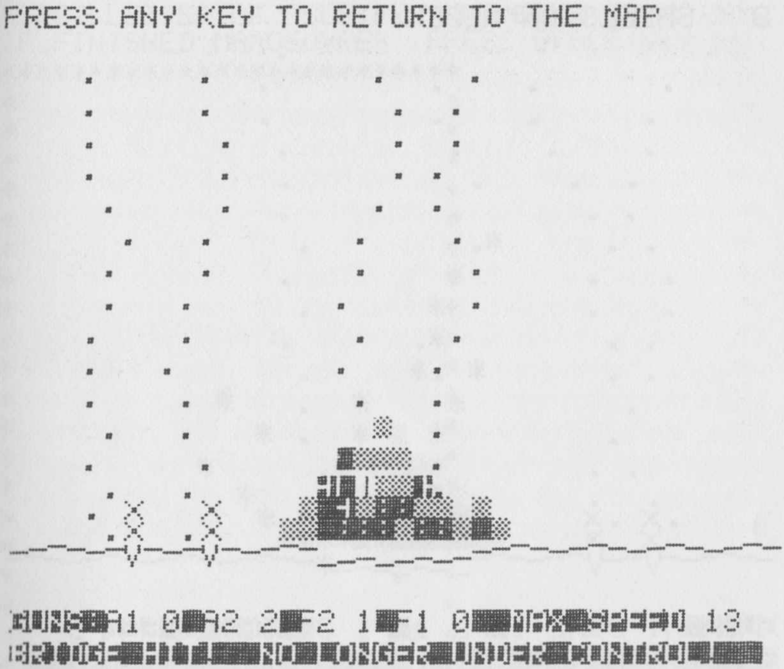
```
GUNS A1 1 A2 3 F2 3 F1 1 MAX SPEED 18
```

It obviously isn't a good day for the Russian fleet! The Tsarina takes a direct hit from my battle cruisers and explodes in spectacular fashion.



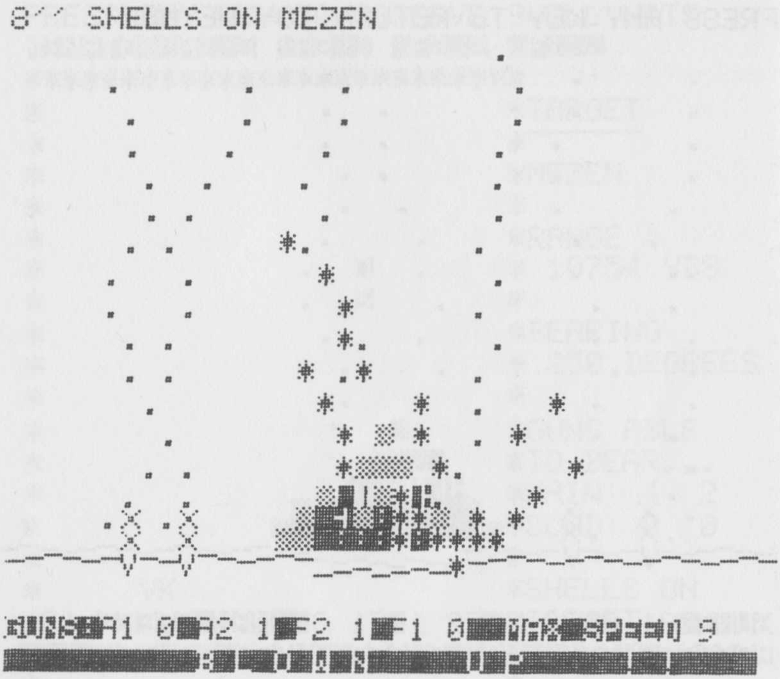
```
PRESS ANY KEY TO OBSERVE SHELL HITS
[illegible]
**************************
*                        *TARGET
*                        *
*                        *MEZEN
*                        *
*                        *RANGE
*                ■       * 10754 YDS
*                ■       *
*                        *BEARING
*                        * 250 DEGREES
*                        *
*                        *GUNS ABLE
*                        *TO BEAR...
*                        *MAIN: 4  2
*                        *SCND: 0  0
*                        *
*     VK                 *SHELLS ON
*                        *TARGET
*             M          *
*                        *
*                        *
**************************
WEST(90) <--*--> (270)EAST
```

And here is the map layout after another four minutes have passed. My two cruisers have steamed off the board to the south-east, but they are still capable of receiving orders and opening fire. Here the Minato is firing on the light cruiser Mezen and has scored two hits with her 8in guns. The Volga, the last survivng Russian battleship, is now accompanied by the Russian light cruiser Kirkov, and both are trying to escape from my battle cruisers.



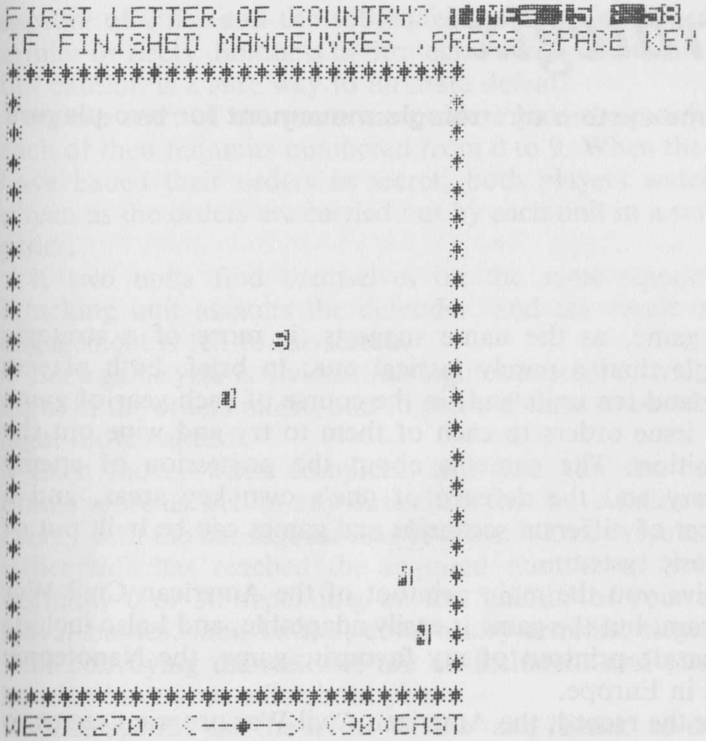
```
PRESS ANY KEY TO RETURN TO THE MAP

GUNS A1 0 A2 2 F2 1 F1 0 MAX SPEED 13
BRIDGE HIT NO LONGER UNDER CONTROL
```

The Russian cruiser Mezen is in deep trouble. All the Japanese 8in guns on my two armoured cruisers are pounding the Mezen into a pile of twisted metal. Three of her secondary guns are gone (light cruisers don't have main armament) and, with all the hits on her funnels, her speed has dropped to 13 knots. The bridge has been hit (the 'diamond' graphic), and she is now going round in a circle out of control. Time to abandon ship! The Mezen won't survive the next Japanese salvo.



```
8'' SHELLS ON MEZEN
GUNS A1 0 A2 1 F2 1 F1 0 MAX SPEED 9
```

Poor old Mezen!



```
FIRST LETTER OF COUNTRY?
IF FINISHED MANOEUVRES ,PRESS SPACE KEY
WEST(270) <--*--> (90)EAST
```

Here is the final display on the map. The Volga and Kirkov have escaped to the south, and my two armoured cruisers have reappeared on the map as they steam westwards. The Japanese flagship Sendai is the only one of my ships to have suffered damage and is now limping along behind the Osaka. The fleets have now lost sight of each other, and the engagement comes to an end with a Japanese victory of 17 points to zero. Two old Russian battleships have been sunk (2 × £7 million) plus one light cruiser valued at £3 million.

A pretty complete victory for the Japanese, caused mainly by my opponent's decision to steer straight for me in the initial stages while I crossed his bow and opened up with all my gunnery. The old battleships proved to be vulnerable to concentrated 12in gunnery.

The 'game time' has lasted just under half an hour, from 15.30 to 15.58.

Strategix

A game system of strategic movement for two players

This game, as the name suggests, is more of a strategic struggle than a purely tactical one. In brief, both players command ten units and, in the course of each year of game time, issue orders to each of them to try and wipe out the opposition. The game is about the possession of enemy territory and the defence of one's own key areas, and a number of different scenarios and games can be built out of the basic system.

I give you the main printout of the American Civil War program; but the game is easily adaptable, and I also include a separate printout of my favourite game, the Napoleonic Wars in Europe.

For the record, the American Civil War program seems to result either in a Confederate victory within two years or in a steady but sure rise of Union domination and ultimate victory. History often repeats itself! In the Napoleonic version, the Allies have a good chance of victory in the first three years; but after that it becomes increasingly hard to beat the French, and if Spain falls completely to the French Revolution, the French should be home and dry.

The ten units in both games are divided into fleets and armies. Units 0 to 2 are fleets, and units 3 to 9 are armies. All the fleets and armies are 'based on' various cities. They don't have to start from those cities, but if they fall to the enemy, the units disappear from the action. It is a game of points where each time a 'square' of land falls to the enemy a point is added to their score, and each time you regain a piece of land the enemy loses a point. You will need to be careful since you may only issue orders once for each unit in each year, and so rapid advance by both sides may lead to a quick capture of cities and the subsequent removal of dependent armies or fleets. Boldness in Strategix often leads to disaster, but caution is a sure way to ultimate defeat!

At the start of the game each side inputs their orders to each of their ten units numbered from 0 to 9. When the sides have issued their orders in secret, both players watch the screen as the orders are carried out by each unit in a random order.

If two units find themselves on the same square, the attacking unit assaults the defender, and the result of the engagement is fed to the screen.

Each game year is divided into eight moves all of which are input in the orders phase, and so you will have to be thinking eight moves ahead.

Each move, when complete, will give you the current points score as well as any base cities that have fallen to the enemy with the consequent loss of units. Victory results once either side has reached the required number of points – normally 0 or 50 depending on the 'colour' of your units. Naval battles, land battles, compulsory retreats, sieges and fleet convoying manoeuvres are all included, and you will have to have your wits about you.

Once again I use the terms 'White' and 'Black' to denote the opposing forces. This is simply 'reverse print' or 'normal print'. The actual colours are blue for the sea and orange for the land.

How to play

On running the program, your basic initial points score will be displayed. Then will come a screen read-out of the units' data. It is a good idea to make a note of the various units and which cities or towns they are based on. Remember that whenever a base is captured by the enemy you will lose the units that are based there.

Next the screen will display the map without any units on it so that both sides may acquaint themselves with the geographical layout.

After the next 'key press', the units – fleets and armies –

will be placed on the map in their starting positions. Both sides having observed the strategic problems involved on the map, it is time to start, with the 'Black' player moving first. The 'White' player looks away while the first player inputs his orders. There is no need to press the 'RETURN' key in this game. Each of the units will be displayed at the top of the screen with its strength and morale and efficiency rating (from 1 to 12). At the top right will be the numbers 1 to 8 for the eight moves each unit makes in each year. To give orders to any unit just press the keys N (for north one square), or S (south one square), or W (west) or E (east). If you want the unit to hold still for one move, type 0. There is no delete command, and so you cannot afford to make mistakes. As you type in the orders (the machine will only accept valid entries as above) your commands will be written to the screen under the appropriate number. When you have typed in eight moves, the next unit will be automatically displayed.

The first three units (0–2) are always the fleets, and numbers 3–9 are the armies.

After the 'Black' orders, the players change places.

Movement

Fleets may move over any part of the sea (this is the 'closed dot' graphic on the PET) and may also occupy coastal land, either friendly or enemy. However every fleet must follow a land occupation square with a sea square. This is to stop fleets occupying Paris or Atlanta!

Armies may move over any land square, friendly or enemy, but will not be able to move on to a sea square. Armies won't drown themselves, and so you're quite safe to give them orders to march into the sea: they just won't move into the water and will stand still!

No units will obey orders to march off the map, nor will they move the 'long way round' the map (i.e. move off the eastern side and reappear by magic on the western side).

Squares marked by a diamond are difficult territory (mountains, rivers, swamps) and will present a fifty/fifty chance of your attempted move on to them not succeeding.

Squares marked by a letter are a city or town square and, if enemy held (i.e. they are in an opposing colour), will also give your move only a fifty/fifty chance of success. Boundary lines, dots and opposing territory will present no problems for a unit moving on to them.

Each time you occupy enemy territory, the 'colour' of the square will change as you pass over it, and you will add one point towards your victory total. Diamond squares, as well as making life difficult for movement, will not add or subtract points on either side and will not change 'colour'. Cities and towns will, however, change 'colour' as they are occupied.

You will have to work out very carefully where your units are to be ordered each move: if they are prevented from movement, they will just stand still and carry out their *next* move with unbounded enthusiasm! This can lead to some disastrous encounters. However, units may never move on to squares occupied by other friendly units, except when convoying.

Convoying

When the results are worked out by the computer, the fleets always move first. This means that an army can be ordered on to a friendly fleet unit at sea. Once at sea you will have to make sure the army unit follows exactly the same path as your fleet otherwise it will be drowned. Never order a fleet on to the landing coastal square, as the army will not be able to move on to a fleet on the land and might be subsequently lost.

Results

Once both sides have made their orders in secret, the players look at the screen together to see the results of their orders for all eight moves for that 'game year'. The fleets move first in a random order, and then the armies flash and display their moves, again in a random order.

If a unit moves on to a square occupied by an enemy unit, combat will take place. If the defending unit is on a friendly city or town letter, the defender has a five-fold advantage. (The letter will only change 'colour' once the unit has passed over it, so once a city is newly captured you will have to move out of it and then back in to get the full advantage in defence.) This fact is marked on the screen by a '*' next to the defending unit to tell both players that the advantage rests with the defence.

The combat calculations are based on the strength of the unit and on the morale and efficiency rating. Battle losses will be displayed on the screen as well as the combat results. If the defending force scores a victory, all the remaining orders for the defeated attacker will be cancelled, and the unit will stand still for the remainder of the year. This is to prevent a unit attacking continuously until it is destroyed.

If the attacker scores a victory, the defender will be forced to retreat in the direction of the attack. If the successful attack was towards the north, then the defender will be forced away northwards. If the defending and retreating unit is forced on to any enemy territory, into an enemy city or the sea or off the map, it is eliminated. This is vital to the attacker's strategy as the losing unit can easily be forced on to an enemy square. Choose your direction of attack with care.

Morale and Efficiency factors will change with the combat results. Losing units will lose men and Morale factors, while victorious units will gain in Morale. If the unit's morale rating falls to 0 at any time, it is removed. No unit may ever have more than a 12-point Morale and Efficiency rating. Apart from victory and defeat, the only other possible result is a draw. Neither side moves up, and the battle losses are calculated and subtracted from the respective strength totals. If the attacker scores a victory, then not only is the defender forced to retreat, but the attacking unit occupies the vacant square.

The computer will work out all eight moves for each year simultaneously. After eight moves, play reverts to the orders stage, and players make their moves in secret for the following year, providing that neither side has obtained the necessary points score for total victory.

Breakdown of listing

Lines	
0–22	Initial array dimensions
23–29	Random 'breaker' to make sure that the RND statement is at a true random start point
30–45	Units data read in plus points data and printout to screen
47–110	Map data read in plus print to screen
111–112	Display units on the map
200–250	Orders input for both sides
252–930	Moves and combat calculations for each move per year
252–328	Basic choice of unit and check to see if it can move at all
340–367	Sub-sort for navy unit
368–380	Naval combat
400–447	Sub-sort for army unit
450–455	Chance of enemy city occupation
460–470	Land combat
5009300	General combat computations
940–972	End of move plus base area capture checks and next move of year
990–995	Date increment and return to orders input for following year
1500–1620	Display of base area capture and unit loss
2000	Data for 'White' forces, initial 'White' points and date
2010–2190	Data for all units, positions, strengths and base areas, etc.
3000–3220	Data for all map lines
4000–4020	GOSUB routine for pause and clear top two lines
4500–4520	GOSUB routine for 'Press any key'
5000–5090	GOSUB routine position change
6000–6820	GOSUB routine to check retreats and combat moves
8000–8010	GOSUB routine for fleet convoying
9000	GOSUB routine for loss of 'Black' unit

9100	GOSUB routine for loss of 'White' unit
12000–12200	GOSUB routine to check if army is still being convoyed
20000–20008	Routine for victory display
30000–30010	GOSUB routine for right justification of casualties display
35000	'Unit is lost' subroutine

The main variables used in this program are:

RP	Current points score
DD	Current year
DD$	Current year as a string
O$(1,9)	Orders string for each unit expressed as an eight-character 'word'
S(1,9)	Current strength of unit expressed as the number of men
M(1,9)	Morale and Efficiency of each unit (1–12)
K(1,9)	Byte screen display 'under' each unit
P(1,9)	Position on the map of each unit (80–997)
C$(1,9)	Base name of city town for each unit
CP(1,9)	Position on the map for the base city town of each unit
D$(22)	All twenty-three lines of the map for screen display
A$(1,9)	Adjective of each unit
MG(1,9)	If = 1, unit has already been calculated this move
B2$	'GET' command for each order
LM	'Black' unit losses in each combat
LR	'White' unit losses in each combat
M8	Maximum threshold for random unit move
M9	Count for number of units moved this turn
K	Byte screen display for square moved to
P	Change in position for each unit
P1	Change in position for a unit forced to retreat after combat

Additional programming information

Provided you have input the correct map data in lines

3000–3220, the little routine in lines 47–80 will solve a lot of trouble by automatically adding colour to the map. The sea is in blue and the land in orange-brown. Cities are marked in red. This is very useful if you have designed your own map for playing another form of Strategix. There are no 64 sound commands in this program, but the colour is very effective!

STRATEGIX – US CIVIL WAR

```
1 REM CC. WALWYN 1979/82
2 REM STRATEGIX
4 REM ALL DATA IS STORED IN LINES 2000-3999
5 REM TERRAIN THAT DOES NOT COST POINTS BUT SLOWS MOVEMENT IS A 'DIAMOND'
10 GOSUB63900:G=US:RP=10:W=TI:DD=1802
20 DIM O$(1,9),S(1,9),M(1,9),K(1,9),P(1,9),C$(1,9),CP(1,9),D$(22),A$(1,9)
22 DIM MG(1,9)
27 POKEUG,UF:POKEUB,U4:PRINT"█STRATEGIX":PRINT"████PRESS ANY KEY"
28 GET B$:IFB$=""THEN28
29 X=TI:FOR Y=WTOX:I=RND(1):NEXT Y
30 READ A$,RP,DD$:PRINT"███"DD$"
35 PRINT"██"A$" START WITH";RP"POINTS":PRINT"█WIN=50 PTS. LOSE=0 PTS██"
36 GOSUB4500:PRINT"█"
40 FOR J=0TO1:FOR I=0TO9
41 READ A$(J,I),P(J,I),S(J,I),M(J,I),C$(J,I),CP(J,I):PRINT"█";
42 IF I>2THEN44
43 PRINTA$(J,I)" FLEET"I"HAS"S(J,I)"MEN":PRINT"AND IS BASED ON "C$(J,I):GOTO45
44 PRINTA$(J,I)" ARMY"I"HAS"S(J,I)"MEN":PRINT"AND IS BASED ON "C$(J,I)
45 NEXT I:PRINT"************█":GOSUB4500:PRINT"█":NEXT J
46 PRINT"PLEASE WAIT FOR ABOUT A MINUTE WHILE    I WORK OUT THE MAP..."
47 FOR I=0TO22:READ D$(I):D5$=""
50 FORJ=1TOLEN(D$(I)):D$=MID$(D$(I),J,1):D4=ASC(D$)
```

```
55 IFD4=166THEND5$=D5$+U9$:GOTO80
60 IFD4>64ANDD4<88THEND5$=D5$+U7$:GOTO80
75 D5$=D5$+U5$
80 D5$=D5$+D$:NEXTJ:D$(I)=D5$:NEXTI
105 POKEUG,U1:PRINT"█":PRINT:POKEUG,U0:POKEUB,U0:FORI=0TO22:PRINTD$(I);:NEXT I
110 GOSUB4005:PRINTUE$;:GOSUB4500:GOSUB4005
111 FOR J=0TO1:FORI=0TO9
112 K(J,I)=PEEK (G+P(J,I)):POKE G+P(J,I),I+48+J*128:NEXT I,J
200 POKEUB,U0:PRINTUE$;"█"
210 FOR J=0 TO 1:GOSUB4500:GOSUB4005:FOR I=0 TO 9
220 IF S(J,I)=0 THEN 250
225 PRINTUE$;"█"A$(J,I)" ORDERS FOR "DD$;TAB(29)"12345678";:B2=0
230 IF I<3 THEN PRINT"██FLEET" I"/STR"S(J,I)"/M&G"M(J,I)
235 IF I>2 THEN PRINT"██ARMY" I"/STR"S(J,I)"/M&G"M(J,I)
237 PRINTU3$;"█████████████████████████████████▄";:GETB2$:IFB2$<>""THEN237
240 GET B2$:IF B2$="E"ORB2$="N"ORB2$="W"ORB2$="S"ORB2$="0"THEN242
241 GOTO240
242 PRINT"█"B2$;"▄";:O$(J,I)=O$(J,I)+B2$:B2=B2+1:IFB2=8THENPRINT"█":GOTO250
245 GOTO240
250 GOSUB4005:NEXT I,J
252 POKEUB,U3:GOSUB4005:PRINTUE$;"█ACTION!":GOSUB4500
270 GOSUB4005
300 FORT=1TO8:M8=3:M9=0
301 J=INT(RND(1)*2):I=INT(RND(1)*M8):IFMG(J,I)=1THEN301
```

```
302 PRINT"█"DD$" MOVE"T
303 MG(J,I)=1
305 IF S(J,I)=0 THEN 900
310 FORNN=0TO2:POKEG+P(J,I),K(J,I):FORN1=0TO50:NEXTN1:POKEG+P(J,I),I+J*128+48
312 FORN1=0TO20:NEXTN1:NEXTNN
315 GOSUB5000:IF P=0 THEN 900
320 K=PEEK(G+P(J,I)+P)
322 IF P+P(J,I)=>1000 OR P+P(J,I)<80 THEN900
323 X=128*J:Y=128:IF J=1 THEN Y=0
325 IF K=255 OR K=127 THEN900
328 M=1:N=I:D=K-176:R$="":C$="":IF J=1 THEN D=I:M=0:N=K-48:C$="█":R$="█"
330 IF I>2 THEN 400
340 IF K>47+Y AND K<58+Y THEN 366
350 IF K=102 OR K(J,I)=102 ORK=230 OR K(J,I)=230 THEN 360
355 GOTO900
360 IF K>Y AND K<27+Y THEN 450
362 IF K=90 THEN 450
365 P(J,I)=P(J,I)+P:GOTO605
366 IFK(J,I)=102ORK(J,I)=230THEN368
367 GOTO900
368 GOSUB4005:PRINT"█ NAVAL   >██ BATTLE >"
370 Q=RND(1)*2:S=RND(1)*2
380 GOTO500
400 IF K=102 ORK=230 THEN900
```

```
405 IF K>47+X AND K<51+X THEN 407
406 GOTO409
407 IF K(J,K-48-X)=102ORK(J,K-48-X)=230THEN GOSUB8000:GOTO605
408 GOTO900
409 IF K>Y AND K<27+Y THEN 450
410 IF K>47+Y AND K<58+Y THEN 460
412 IF K>47+X AND K<58+X THEN900
440 IF K=90 THEN 450
447 P(J,I)=P(J,I)+P:GOTO605
450 W=RND(1)*10
452 IF W>5 THEN 447
453 GOSUB4005:PRINT"█"A$(J,I)" FORCE NO."I"CANNOT MOVE":GOSUB4000
455 K=0:GOTO900
460 IF K(M,K-48-Y)=102 ORK(M,K-48-Y)=230 THEN 900
465 Q=RND(1)*9+1:S=RND(1)*9+1
470 GOSUB4005:PRINT"█ LAND   >██ BATTLE >"
500 GOSUB30000
501 N0=S(0,N)*(M(0,N)+1)*Q:N1=S(1,D)*(M(1,D)+1)*S
502 FOR W=1 TO 60:POKE G+P(0,N),K(0,N):POKE G+P(1,D),K(1,D)
503 POKE P(0,N)+G,N+48:POKE P(1,D)+G,D+176:NEXT W
504 IF K(M,K-48-Y)>Y AND K(M,K-48-Y)<27+Y THEN 506
505 GOTO508
506 PRINT"███*":N0=N0/5:IF J=1 THEN N0=N0*5:N1=N1/5:PRINT"█*██ "
507 FOR Y=1TO1000:NEXTY
```

```
508 FOR Y=1TO7:IF N0*Y>=N1*(8-Y) THEN 510
509 NEXT Y:Y=8
510 LM=300*Y*S:LR=300*(9-Y)*Q:CC$="■DRAW■■DRAW"
511 IF Y>5 THEN CC$="■■VICTORY!"
512 IF Y<4 THEN CC$="■VICTORY!"
513 PRINT"■        ■■     "
514 PRINT CC$:S(0,N)=S(0,N)-LM:S(1,D)=S(1,D)-LR
515 IF Y>5 THEN M(1,D)=M(1,D)+Y-5:M(0,N)=M(0,N)-(Y-5)
520 IF Y<4 THEN M(1,D)=M(1,D)-(4-Y):M(0,N)=M(0,N)+4-Y
530 IF M(0,N)>12THENM(0,N)=12
540 IF M(1,D)>12THENM(1,D)=12
580 S(0,N)=INT(S(0,N)):S(1,D)=INT(S(1,D))
581 FOR W=1TO2000:NEXT W:PRINT"■               ■■        ":
582 LM$=STR$(INT(LM)):LR$="■"+STR$(INT(LR))
583 IF S(0,N)<=0 OR M(0,N)<=0 THEN S(0,N)=0:LM$="TOTAL":GOSUB9000
584 IF S(1,D)<=0 OR M(1,D)<=0 THEN S(1,D)=0:LR$="■TOTAL■":GOSUB9100
585 PRINT"■BATTLE >■■LOSSES >"
586 PRINT"■"TAB(37-LEN(LM$))LM$;TAB(78-LEN(LR$))LR$:GOSUB4000
587 IF J=0 AND Y<4 THEN E=1:F=D:GOTO600
588 IF J=1 AND Y>5 THEN E=0:F=N:GOTO600
589 IFI>2AND(K(J,I)=102ORK(J,I)=230)THENGOSUB12100
590 IF J=0 AND Y>5 THEN O$(0,N)="00000000"
592 IF J=1 AND Y<4 THEN O$(1,D)="00000000"
595 GOTO900
```

```
600 P(J,I)=P(J,I)+P:GOSUB6000:K=PEEK(G+P(J,I))
605 IF K(J,I)=102 OR K(J,I)=90 OR K(J,I)=230 THEN 620
606 IF J=0 AND K(J,I)>128 THEN K(J,I)=K(J,I)-128:RP=RP-1
610 IF J=1 AND K(J,I)<127 THEN K(J,I)=K(J,I)+128:RP=RP+1
620 POKE G+P(J,I)-P,K(J,I):POKE G+P(J,I),I+J*128+48:K(J,I)=K
900 M9=M9+1
902 FOR Y=0TO2:POKE G+P(J,Y),Y+48+J*128:NEXT Y
903 M8=3:IFM9>=6THENM8=10
904 IFM9<20THEN301
905 FOR J=0TO1:FORI=0TO9
906 PK=PEEK(G+CP(J,I))
908 IF K(J,I)=102 OR K(J,I)=230 THEN GOSUB12000
910 IF PK<219-J*128 AND PK>175-J*128 AND P(J,I)<>999 THEN GOSUB1500
930 NEXT I,J
940 PRINT"■END OF MOVE "T" FOR "DD$".POINTS=■"RP
941 IF RP=>50THEN PRINT"■WHITE";:GOTO20000
942 IF RP<=0THEN PRINT"BLACK";:GOTO20000
943 FORJ=0TO1:FORI=0TO9:MG(J,I)=0:NEXTI,J
944 GOSUB4500:GOSUB4005:NEXT T
960 FOR J=0 TO 1:FOR I=0TO9
962 MG(J,I)=0:IF S(J,I)=0 THEN 972
963 W=RND(1)*.2
964 O$(J,I)=""
965 IF I<3 THEN W=W/2
```

```
970 M(J,I)=M(J,I)+1:S(J,I)=INT(S(J,I)*(1+W)):IFM(J,I)<4THENM(J,I)=4
971 IF M(J,I)>12 THEN M(J,I)=12
972 NEXT I,J
990 DA$="":DD=VAL(RIGHT$(DD$,2)):DD=DD+1:IFDD<10THENDA$="0"
992 DD$=LEFT$(DD$,LEN(DD$)-2)+DA$+RIGHT$(STR$(DD),LEN(STR$(DD))-1)
995 GOTO200
1500 GOSUB4005:PRINT"▣"C$(J,I)" FALLS!
1610 PRINTA$(J,I)" FORCE NO."I"IS REMOVED":GOSUB35000
1620 GOSUB4000:RETURN
2000 DATA "THE UNION FORCES",8,"1861"
2010 DATA "CONFEDERATE",353,6000,8,"NORFOLK",351
2020 DATA "CONFEDERATE",788,5000,7,"JACKSONVILLE",785
2030 DATA "CONFEDERATE",808,3500,7,"NEW ORLEANS",726
2040 DATA "VIRGINIA",348,60000,10,"RICHMOND",350
2050 DATA "VIRGINIA",346,40000,9,"RICHMOND",350
2060 DATA "S.CAROLINA",545,40000,9,"COLUMBIA",585
2070 DATA "GEORGIA",660,35000,10,"ATLANTA",579
2080 DATA "E.TENNESSEE",458,30000,9,"CHATTANOOGA",457
2090 DATA "W.TENNESSEE",409,40000,10,"MEMPHIS",447
2095 DATA "MISSISSIPPI",647,50000,9,"JACKSON",607
2100 DATA "▣UNION",231,9000,9,"WASHINGTON",230
2110 DATA "▣UNION",556,8000,8,"PHILADELPHIA",192
2120 DATA "▣UNION",892,6000,8,"WASHINGTON",230
2130 DATA "▣NORTHERN",190,85000,8,"WASHINGTON",230
```

```
2140 DATA "▣NORTHERN",113,65000,6,"WASHINGTON",230
2150 DATA "▣PENNSYLVANIA",107,50000,6,"PITTSBURGH",105
2160 DATA "▣OHIO",142,55000,6,"CINCINNATI",178
2170 DATA "▣INDIANA",214,55000,6,"INDIANAPOLIS",134
2180 DATA "▣ILLINOIS",248,70000,7,"CAIRO",288
2190 DATA "▣MID-WESTERN",85,50000,6,"ST. LOUIS",205
3000 REM MAP DATA
3010 DATA "▣.....|.....|.....|......|P..........▬▒▒▒▚"
3020 DATA "▣.....|.....|..I..|......┤.▬◆▣..........▬▒▒▒▚"
3030 DATA "▣.....▬◆◆▣....|.....|C...╭╯╰▬◆▣╭─╮...P▬▒▣..▬▒▒▒▚"
3040 DATA "▣.....S|...╭╯...╭──┴───╯▬..◆◆◆╰▣XW▬▒▣.▬▒▒▣.▬▒▒▒▚"
3050 DATA "▣.......▬◆▣...|.╭──╯L....╰▬.◆◆◆..▣╰X▬▒▣..▬▒▒▒▒▚"
3060 DATA"▣......▬◆◆▣C.▬◆▣─╯.........╭╯▬◆◆....XX▒▒▣.▬▒▒▒▒▚"
3070 DATA "▣........▬◆▣─▬◆◆▣..........╭╯▬◆◆◆....XRN▒▒▒▒▒▒▚"
3075 DATA "▣────────▬◆▣───────────▬◆◆▣┴─▬◆◆◆─────X─▒▒▒▒▒▒▚"
3080 DATA "◆.....▒◆....N....◆.K.◆◆◆......◆▒▒▒▒▒▒▒▚"
3090 DATA ".◆◆...▒M.......◆◆C.◆◆.........W▒▒▒▒▒▒▒▚"
3100 DATA "...◆.▒▒───┬─────◆┬────┬───────▒▒▒▒▒▒▒▚"
3110 DATA "....◆▒◆◆..|......◆|.◆.╰╮.....▒▒▒▒▒▒▒▚"
3120 DATA "──────▒VX..|.......|◆A..╰─╮C.▒▒▒▒▒▒▒▚"
3130 DATA "...◆▒▒XJ..|...M..|.......╰╮.▒▒▒▒▒▒▒▚"
3140 DATA "....▒.....|.......|........╰▒▒▒▒▒▒▒▚"
3150 DATA "....▒.....|.......|........S▒▒▒▒▒▒▒▚"
3160 DATA "...◆▒▒N◆..|...╭───┴──────────▒▒▒▒▒▒▒▚"
```

```
3170 DATA "..◆◆◆▒◆▒▒▒▒▒▒▒▒▒▒...◆....J▒▒▒▒▒▒▒▒▒▒▒▒▒▚"
3180 DATA "▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒◆◆◆..◆▒▒▒▒▒▒▒▒▒▒▒▚"
3190 DATA "▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒◆.◆◆▒▒▒▒▒▒▒▒▒▒▒▚"
3200 DATA "▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒.◆◆▒▒▒▒▒▒▒▒▒▒▚"
3210 DATA "▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒◆.▒▒▒▒▒▒▒▒▒▒▚"
3220 DATA "▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▚"
4000 FOR W=1TO3000:NEXT W
4005 PRINT"S                                       "
4010 PRINT"SQ                                        S"
4020 RETURN
4500 PRINT"PLEASE PRESS ANY KEY"
4510 GET A$:IF A$="" THEN 4510
4520 RETURN
5000 P=0:B$=MID$(O$(J,I),T,1)
5010 IF B$="N" THEN P=-40
5020 IF B$="S" THEN P=40
5030 IF B$="W" THEN P=-1
5040 IF B$="E" THEN P=1
5090 RETURN
6000 IF P(E,F)=999 THEN RETURN
6005 P1=P(E,F)+P:K=K(E,F)
6008 IF PEEK(G+P1)=127 OR P1<80 OR P1=>1000 THEN 6510
6010 IF F>2 THEN 6500
6020 IF PEEK(G+P1)=102 OR PEEK(G+P1)=230 THEN 6800
```

```
6030 GOTO6510
6500 IF PEEK(G+P1)=102 OR PEEK(G+P1)=230 THEN 6510
6502 IF PEEK(G+P1)>47+E*128 AND PEEK(G+P1)<58+E*128 THEN 6510
6505 IF PEEK(G+P1)>E*128 AND PEEK(G+P1)<(127+E*128) THEN 6800
6507 IFPEEK(G+P1)=90THEN6800
6510 PRINT"■"A$(E,F)" FORCE IS REMOVED":GOSUB4000
6520 S(E,F)=0:POKE G+P(E,F),K(E,F):P(E,F)=999:RETURN
6800 POKE G+P(E,F),K(E,F):P(E,F)=P1:K(E,F)=PEEK(G+P1)
6810 POKE G+P(E,F),F+48+E*128
6820 RETURN
8000 K=K(J,K-48-J*128):P(J,I)=P(J,I)+P:GOSUB4005
8010 PRINT"■ARMY"R$;I;C$"IS BEING CONVOYED":GOSUB4000:RETURN
9000 POKE G+P(0,N),K(0,N):P(0,N)=999:RETURN
9100 POKE G+P(1,D),K(1,D):P(1,D)=999:RETURN
12000 IF PEEK(G+P(J,I))=102 OR PEEK(G+P(J,I))=230 THEN 12100
12050 RETURN
12100 GOSUB4005:PRINT"■"A$(J,I);" ARMY";I;"IS DROWNED!":GOSUB35000
12200 GOSUB4000:RETURN
20000 PRINT" VICTORY!":FORI=1TO220:PRINT"■◥▼▼▼▼▼▼▼◤"
20002 PRINT"■▼▼▼▼▼▼▼▼":NEXTI:GOSUB4005
20005 PRINT"■TO PLAY AGAIN PRESS ANY KEY"
20007 GET A$:IF A$=""THEN20007
20008 RUN
30000 PRINT"■";
```

```
30004 W1=30-LEN(STR$(S(0,N)))
30005 W2=30-LEN(STR$(S(1,D)))
30006 PRINTTAB(10)A$(0,N);TAB(W1)S(0,N)
30007 PRINTTAB(10)A$(1,D);TAB(W2)S(1,D)
30010 RETURN
35000 S(J,I)=0:POKEG+P(J,I),K(J,I):P(J,I)=999:RETURN
63900 REM COMMODORE 64 COLOUR/SOUND CODES
63902 US=1024:UC=55296:UG=53281:UB=53280:UV=54296:UA=54277:UD=54278:UH=54273
63905 UL=54272:UW=54276:U0=0:U0$="■":U1=1:U1$="■":U2=2:U2$="■":U3=5:U3$="■"
63910 U4=6:U4$="■":U5=8:U5$="■":U6=9:U6$="■":U7=10:U7$="■":U8=13:U8$="■"
63915 U9=14:U9$="■":UU=4:UU$="▒":UR=12:UR$="■":UE=7:UE$="■":UF=11:UF$="▣"
63930 RETURN

READY.
```

So far I have only given you the listing for the American Civil War version of Strategix. I have built up many others at home which all seem to function pretty well. Since all the data for the game is given in lines 2000–3220, you can simply make up your own data lines and substitute them for the ones in my listing.

When you do so, there are a few guidelines.

Lines 2000–2190

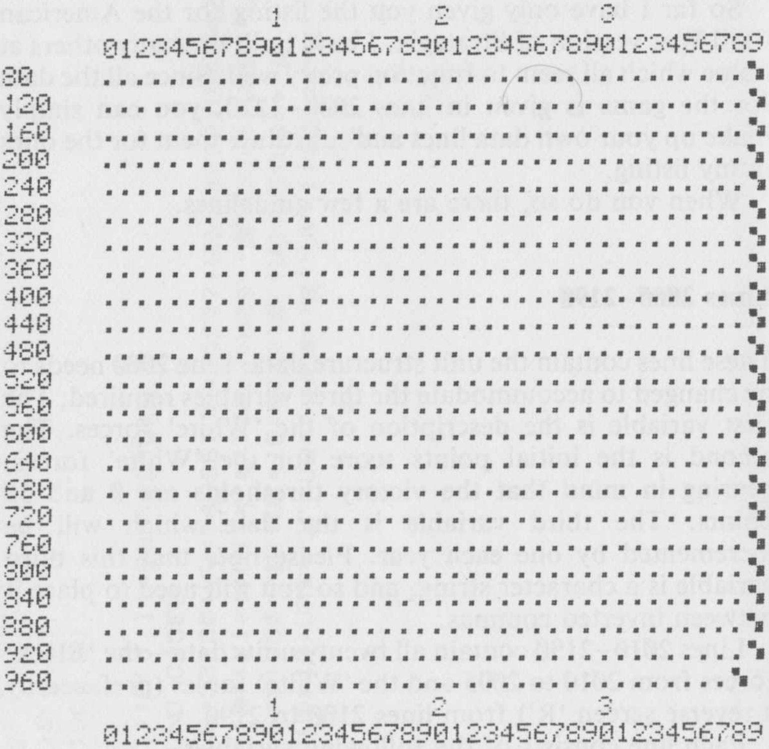
These lines contain the unit structure data. Line 2000 needs to be changed to accommodate the three variables required. The first variable is the description of the 'White' forces. The second is the initial points score for the 'White' forces, bearing in mind that the victory thresholds are 0 and 50 points. The third variable is the date which will be incremented by one each year. Please note that this third variable is a character string, and so you will need to place it between inverted commas.

Lines 2010–2190 contain all twenty units data – the 'Black' forces from 2010 to 2095 and the 'White' forces (prefaced by a reverse screen 'R') from lines 2100 to 2190.

Each line consists of the following variables.

A$	The adjective of the unit (e.g. French, Union, Roman, etc.)
P	The starting position on the screen from 80 to 997 (see figure)
S	The number of men in the unit (Strength)
M	The Morale and Efficiency rating from 1 to 12
C$	The name of the city or town that the unit is based on
CP	The position on the screen of that base city or town

A$ and C$ are string variables and need inverted commas on either side of them. The rest are normal numeric variables.



```
                 1         2         3
      0123456789012345678901234567890123456789
80    .......................................▚
120   .......................................▚
160   .......................................▚
200   .......................................▚
240   .......................................▚
280   .......................................▚
320   .......................................▚
360   .......................................▚
400   .......................................▚
440   .......................................▚
480   .......................................▚
520   .......................................▚
560   .......................................▚
600   .......................................▚
640   .......................................▚
680   .......................................▚
720   .......................................▚
760   .......................................▚
800   .......................................▚
840   .......................................▚
880   .......................................▚
920   .......................................▚
960   .......................................▚
                 1         2         3
      0123456789012345678901234567890123456789
```

Figure A

Lines 3000–3220

These lines contain all the map data. When I draw up a map, I use a diagram like figure (A) which contains all the screen squares available. There are 23 lines to the map, and each line is 40 squares long. Note that the final square is marked by a 'chequered graphic' and may not be used for map or unit display. Each line must end with this graphic symbol. The final line is only 23 squares wide.

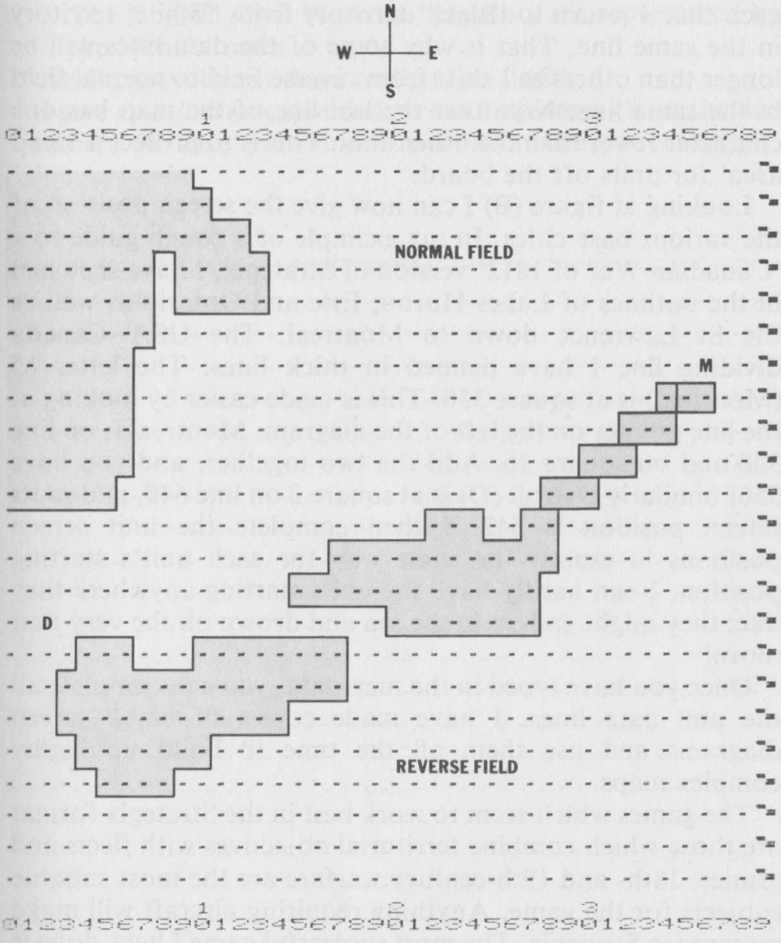

N
W
E
S
1
2
3
0123456789012345678901234567890123456789
NORMAL FIELD
M
D
REVERSE FIELD
1
2
3
0123456789012345678901234567890123456789

Figure B

I firstly sketch out the sea squares and then mark on the boundaries on the land (if any). Next I place the city or town letters on the map as in figure (B). Only then do I colour in which squares are to be 'White owned'. I also mark in any 'diamond' squares to mark difficult terrain. Once I am happy with the map, I type in the data as in lines 3010–3220, remembering to put a reverse field 'R' symbol in each time I come to 'White' territory and a cancel reverse field symbol each time I return to 'Black' territory from 'White' territory in the same line. That is why some of the data lines will be longer than others as I shift from reverse field to normal field in the same line. Note that the last line of the map has one character fewer than the other lines. This is to protect a 'dead area' for units off the board.

Looking at figure (B) I can now give the screen position of the various base cities. In my example of a rough guide to a 'Canadian War of 1812' version of Strategix, I have sketched in the outlines of Lakes Huron, Erie and Ontario as well as the St Lawrence down to Montreal. The USA–Canada dividing line I have penned in thick lines. The letter M (Montreal) is at square 356. This is made easier by looking at the line pointer on the left of the diagram. Montreal is on line 320 and on square 36. Add the two together, and you have 356! Similarly Detroit (D) is at square 2 on line 640, and so its screen position is 642. I then complete the unit screen positions in exactly the same way for each unit's starting position. I can hardly have the units starting anywhere they like: they might end up in the sea and drown on the very first move!

Once you have typed in the map data, you can complete all the unit data lines. I have made copies of blank screen diagrams and use them all the time to build up highly complex maps.

The games which seem to work best in the Strategix format are those which combine territorial objectives with fleets and armies. 18th- and 19th-century warfare are the most suitable subjects for the game. Anything requiring aircraft will make no sense in Strategix. The most successful game I have done is the Napoleonic Europe scenario. I therefore include all the data lines for you to copy in for that game in case you get bored with the American Civil War. Other versions you might like to try include:

The First World War in Europe: Germany is the White player

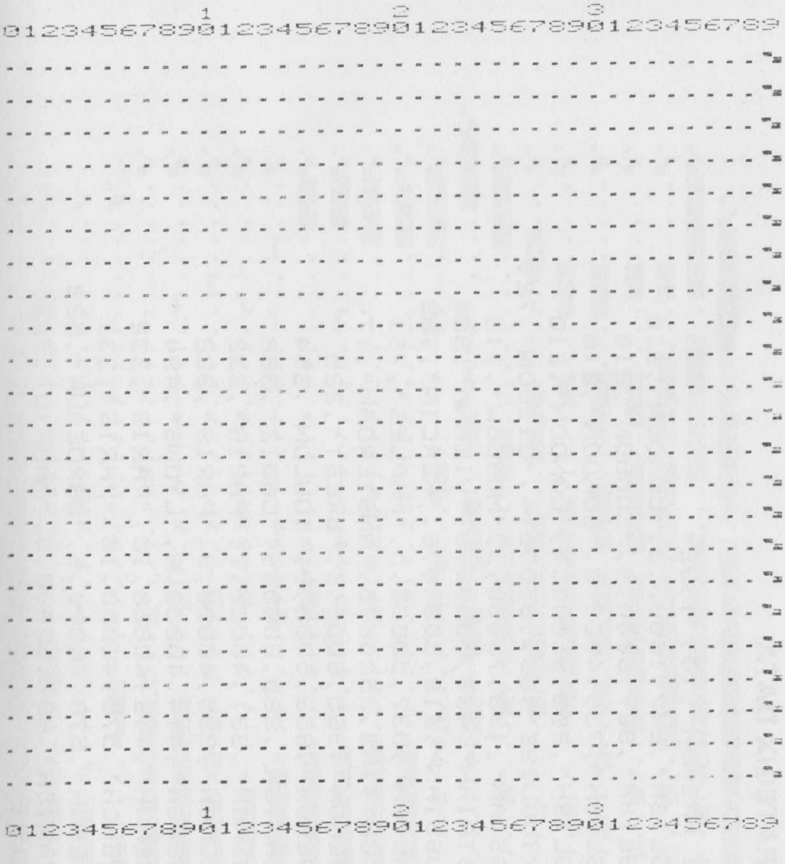
The Punic wars between Rome and Carthage: Carthage is the 'White' player

The Canadian war of 1812: the USA is the 'White' player

The English Civil War: the Royalists are represented by the 'White' units

And many others: there really is no limit!

I give you also an expanded screen diagram without the line numbers in case you find the smaller size too cramped.

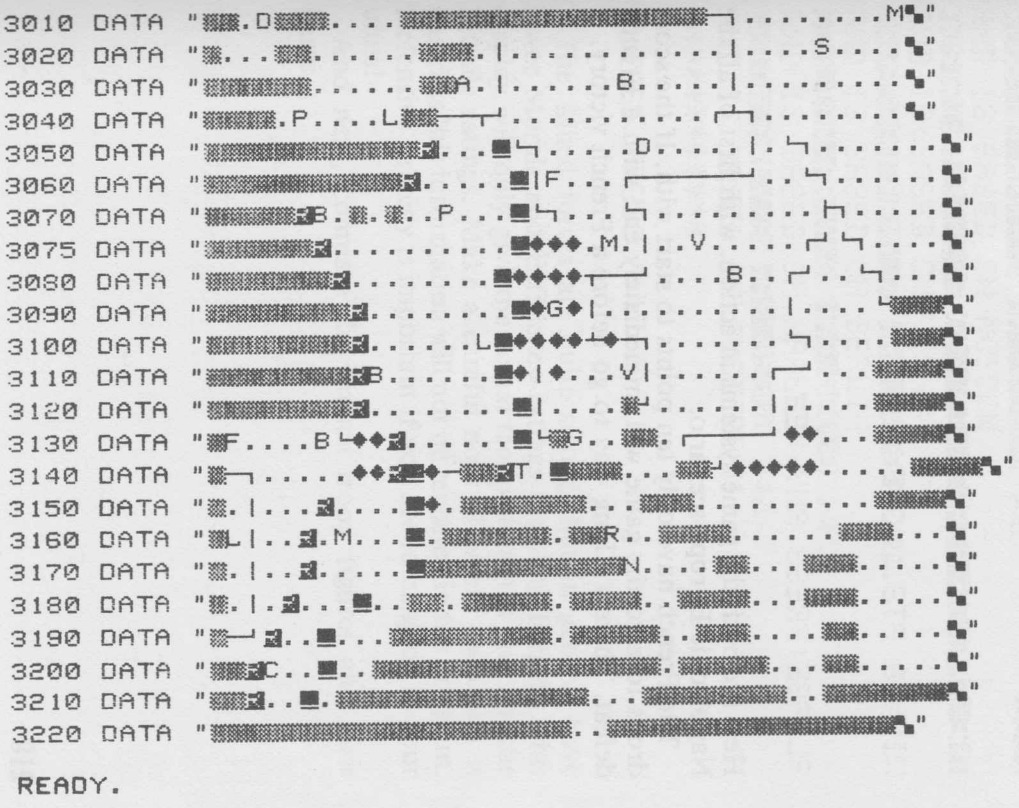


1 2 3
0123456789012345678901234567890123456789
1 2 3
0123456789012345678901234567890123456789

Figure C

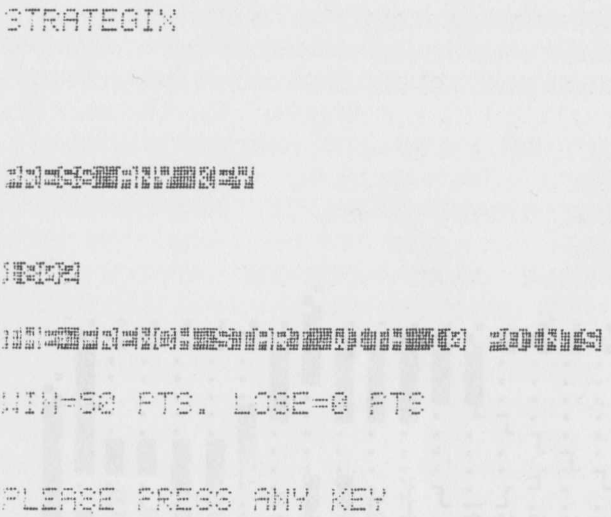
NAPOLEONIC STRATEGIX DATA

```
2000 DATA "THE FRENCH",10,"1802"
2010 DATA "ENGLISH",247,10000,8,"LONDON",210
2020 DATA "ENGLISH",967,6000,8,"LONDON",210
2030 DATA "ENGLISH",735,4000,8,"LONDON",210
2040 DATA "ENGLISH",209,35000,7,"LONDON",210
2050 DATA "PORTUGUESE",681,35000,4,"LISBON",721
2060 DATA "RUSSIAN",193,75000,5,"MOSCOW",118
2070 DATA "AUSTRIAN",463,50000,5,"VIENNA",385
2080 DATA "PRUSSIAN",218,50000,6,"BERLIN",183
2090 DATA "ITALIAN",537,50000,5,"NAPLES",781
2095 DATA "DUTCH",135,35000,5,"AMSTERDAM",174
2100 DATA "▚FRENCH",365,6000,5,"BREST",325
2110 DATA "▚FRENCH",653,5000,5,"TOULON",654
2120 DATA "▚SPANISH",880,8000,3,"CADIZ",882
2130 DATA "▚FRENCH",331,40000,7,"PARIS",332
2140 DATA "▚FRENCH",295,40000,9,"PARIS",332
2150 DATA "▚FRENCH",414,40000,9,"LYONS",494
2160 DATA "▚FRENCH",412,40000,10,"PARIS",332
2170 DATA "▚FRENCH",575,40000,10,"PARIS",332
2180 DATA "▚FRENCH",570,40000,9,"BORDEAUX",528
2190 DATA "▚SPANISH",687,35000,3,"MADRID",726
3000 REM MAP DATA
```



```
READY.
```

Examples of play



```
STRATEGIX



[illegible]


[illegible]

[illegible]

WIN=50 PTS. LOSE=0 PTS


PLEASE PRESS ANY KEY
```

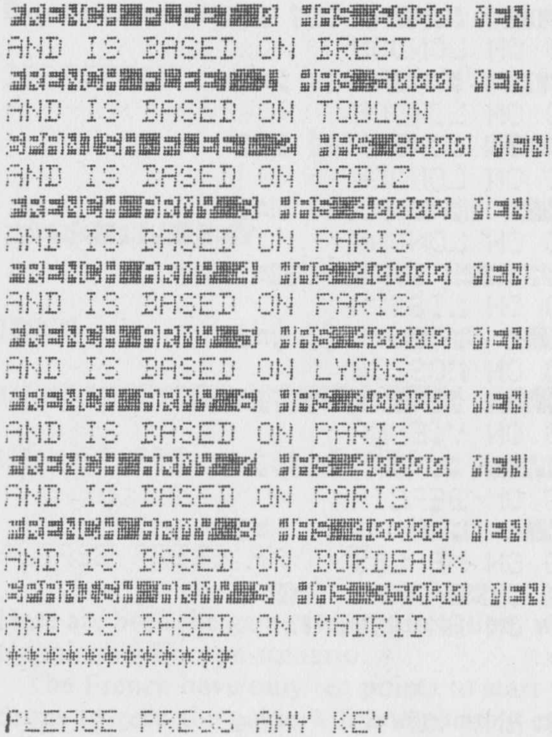
Here are both the game systems in action, with first of all the Napoleonic Europe scenario.

The French have only ten points to start with. If the score drops to zero the game will immediately end with a French defeat. There's a long way to go before a French victory.

```
ENGLISH FLEET 0 HAS 10000 MEN
AND IS BASED ON LONDON
ENGLISH FLEET 1 HAS 6000 MEN
AND IS BASED ON LONDON
ENGLISH FLEET 2 HAS 4000 MEN
AND IS BASED ON LONDON
ENGLISH ARMY 3 HAS 35000 MEN
AND IS BASED ON LONDON
PORTUGUESE ARMY 4 HAS 35000 MEN
AND IS BASED ON LISBON
RUSSIAN ARMY 5 HAS 75000 MEN
AND IS BASED ON MOSCOW
AUSTRIAN ARMY 6 HAS 50000 MEN
AND IS BASED ON VIENNA
PRUSSIAN ARMY 7 HAS 50000 MEN
AND IS BASED ON BERLIN
ITALIAN ARMY 8 HAS 50000 MEN
AND IS BASED ON NAPLES
DUTCH ARMY 9 HAS 30000 MEN
AND IS BASED ON AMSTERDAM
************

PLEASE PRESS ANY KEY
```

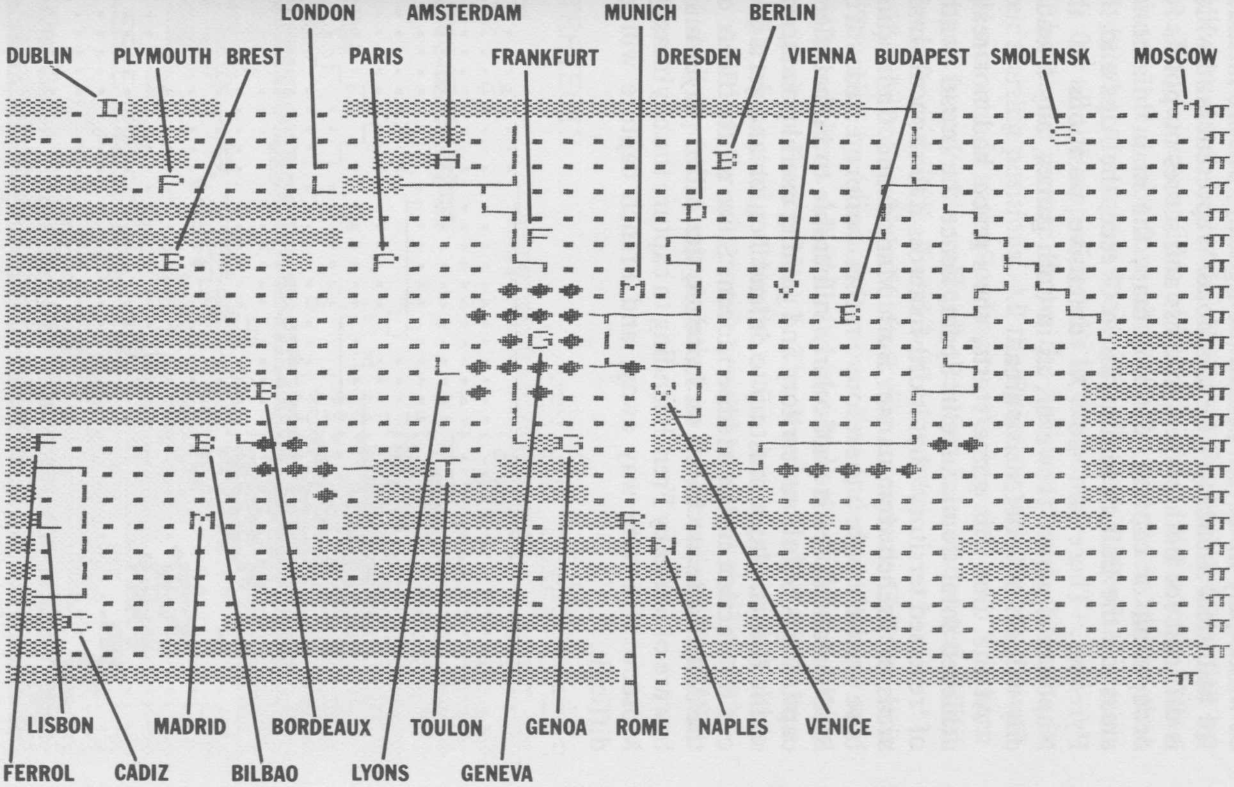
The Allied forces are quite strong, but in general have lower Morale and Efficiency ratings than the French. This display will only give the actual troop strengths and not the Morale ratings. Make a careful note of where each unit is based as this information will not be repeated in the program. Defensive strategy is important if you are to hang on to your units!

And next, compare the French troop figures and their bases.



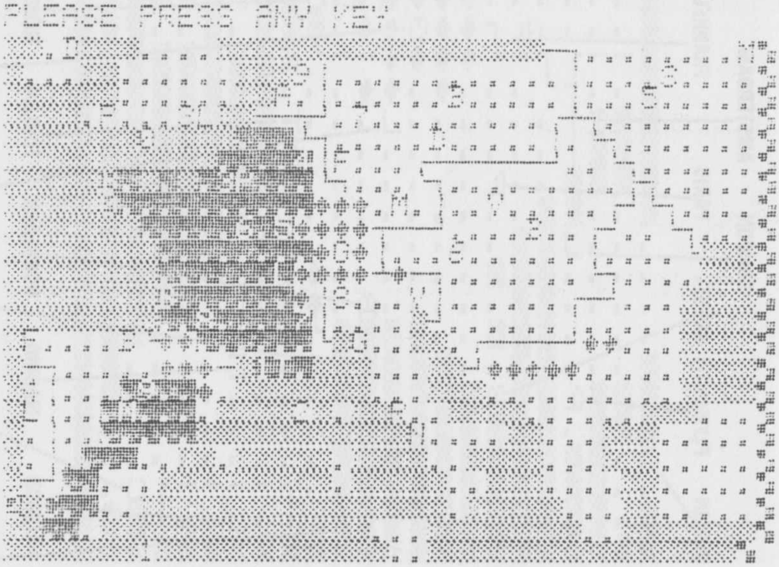
```
[illegible]
AND IS BASED ON BREST
[illegible]
AND IS BASED ON TOULON
[illegible]
AND IS BASED ON CADIZ
[illegible]
AND IS BASED ON PARIS
[illegible]
AND IS BASED ON PARIS
[illegible]
AND IS BASED ON LYONS
[illegible]
AND IS BASED ON PARIS
[illegible]
AND IS BASED ON PARIS
[illegible]
AND IS BASED ON BORDEAUX
[illegible]
AND IS BASED ON MADRID
************

PLEASE PRESS ANY KEY
```

NAPOLEONIC EUROPE


LONDON
AMSTERDAM
MUNICH
BERLIN
DUBLIN
PLYMOUTH
BREST
PARIS
FRANKFURT
DRESDEN
VIENNA
BUDAPEST
SMOLENSK
MOSCOW
LISBON
MADRID
BORDEAUX
TOULON
GENOA
ROME
NAPLES
VENICE
FERROL
CADIZ
BILBAO
LYONS
GENEVA

The European map is filled with cities and capitals – many of which play no actual part in the fighting, but are included for historical accuracy. The 'diamonds' represent land which is difficult for both players to cross and scores no points for occupation or capture. On this map, the main 'diamond' areas are the Balkan mountains in Greece, the Alps and the Pyrenees. There are no 'X' defensive positions in the Napoleonic game. However, as in both games, any friendly city will act as a defensive area.

At the time this game starts, the French had not really achieved total dominance in Spain, hence the broad swathe of 'reversed territory' that is drawn across it to show the main areas of French dominance. Both Madrid and Cadiz (unit base areas) are therefore rather unprotected. The Mediterranean sea is particularly vulnerable to French fleets capturing Alied shore territory and gaining useful points, and so the French player must try to defend Toulon and get a fleet out into action in the Mediterranean. Since all the fleets on the Allied side are based on London, the Allied player must beware of a sneaky French landing to capture the city! Lastly, Moscow is a long way away, and French capture will be difficult.

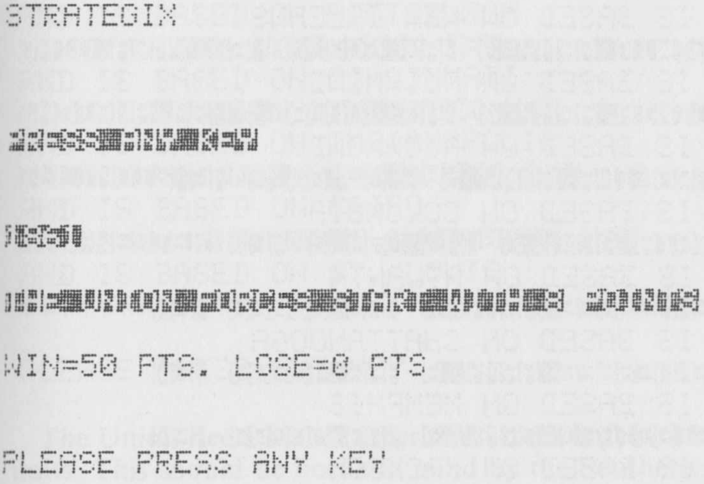


Since the normal computer 'print out' will display the screen in a series of lines, the diagrams given in this book will look very much better on the screen than printed out line by line. To give you an idea of how it looks on the screen, I have printed out a laborious character by character system that shows what the screen looks like. I haven't been able to do this for all the map diagrams in the book.

The above picture shows the basic map with the units in their starting positions. All the fleets are at sea to begin with and no unit is sitting on a city. As you can see, Northern France is very vulnerable at the start to a concerted Allied attack from units 9, 7 and 3 (if convoyed).

There's not much point in trying to capture Geneva. It is surrounded by 'diamond' mountains and doesn't have any unit based there. Allied Unit 8 (the Italian army) has a strong opponent in French Unit 7. The Russian Unit 5 will take a couple of years to get into the action, but is a vast army which the Allied player will certainly need to defeat the French.

I shall now turn my attention to the American Civil War program . . .

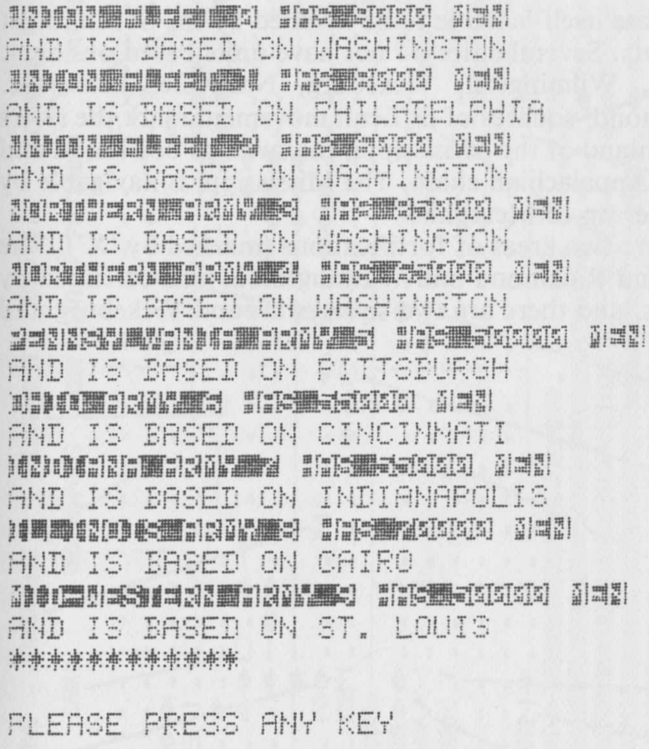


```
STRATEGIX

[illegible]

[illegible]

[illegible]

WIN=50 PTS. LOSE=0 PTS

PLEASE PRESS ANY KEY
```

The Union forces face the same problem as the French forces in the Napoleonic scenario: they are vulnerable to defeat early on as their points margin is so low. The Union would have split apart if early Confederate victories had led to a reappraisal by international opinion. So an early Union plan is to attack hard and suffer heavy losses if necessary in order to gain a few points of territory in the first few years. But of course you will then leave yourself open to attack by Confederate units who might go on a rampage of Northern capital cities. Indeed this is certainly the best strategy for the Confederates to pursue – attack in the west and try to gain enough points in the first year for a victory. With only eight points needed, it is quite easy to get a couple of units loose on a marauding mission and 'burn up' Kentucky or Ohio. Since the Union forces are so strong in the east, headlong attacks on Washington will probably lead to disaster. 'Bull Run' in this game might be rather more decisive than in history!

```
CONFEDERATE FLEET 0 HAS 6000 MEN
AND IS BASED ON NORFOLK
CONFEDERATE FLEET 1 HAS 4000 MEN
AND IS BASED ON JACKSONVILLE
CONFEDERATE FLEET 2 HAS 3500 MEN
AND IS BASED ON NEW ORLEANS
VIRGINIA ARMY 3 HAS 60000 MEN
AND IS BASED ON RICHMOND
VIRGINIA ARMY 4 HAS 40000 MEN
AND IS BASED ON RICHMOND
S.CAROLINA ARMY 5 HAS 40000 MEN
AND IS BASED ON COLUMBIA
GEORGIA ARMY 6 HAS 35000 MEN
AND IS BASED ON ATLANTA
E.TENNESSEE ARMY 7 HAS 30000 MEN
AND IS BASED ON CHATTANOOGA
W.TENNESSEE ARMY 8 HAS 40000 MEN
AND IS BASED ON MEMPHIS
MISSISSIPPI ARMY 9 HAS 50000 MEN
AND IS BASED ON JACKSON
************

PLEASE PRESS ANY KEY
```

The Confederate units are generally smaller than the Union forces, but they are better trained and so have a higher Morale and Efficiency rating (not shown here). Since so many of the trained officers were Southerners, the smaller forces should be able to look after themselves providing they are not asked to take on an opposing Union unit in a defensive position. Headlong attacks may do wonders for 'esprit de corps', but precious little for battle casualties which the South cannot afford.

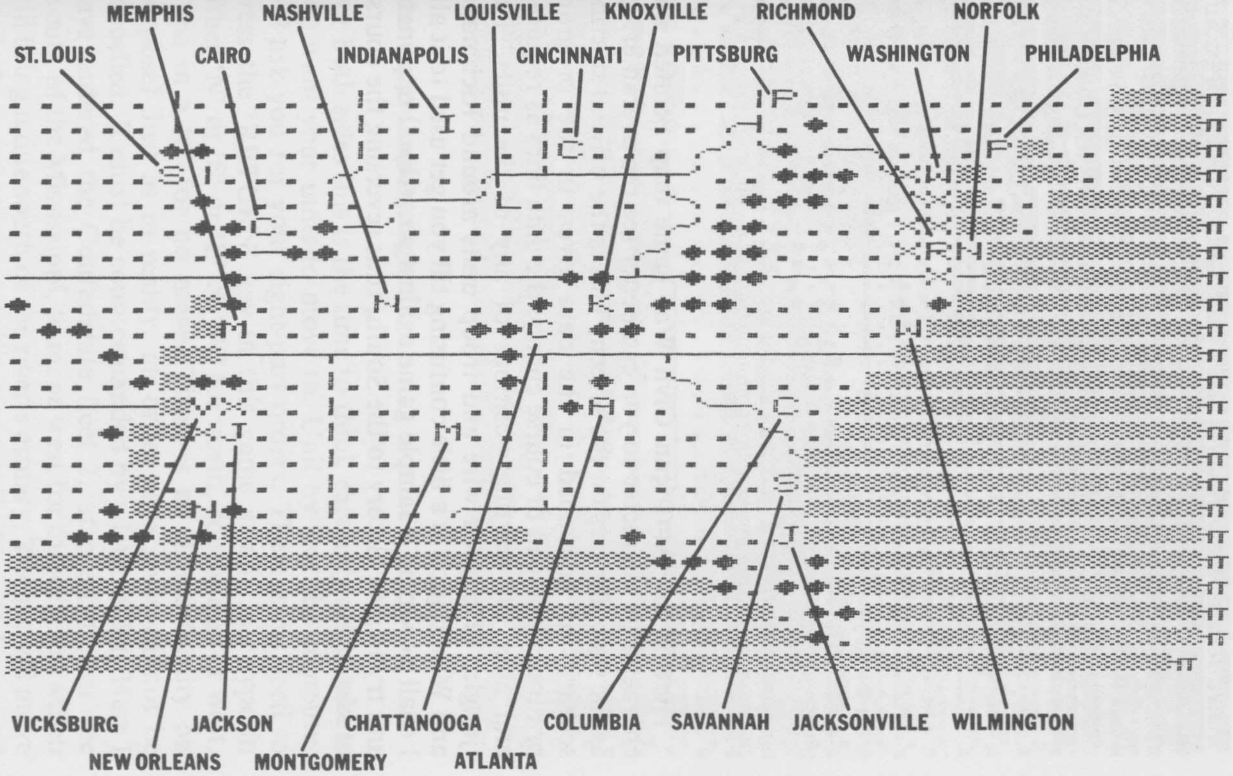


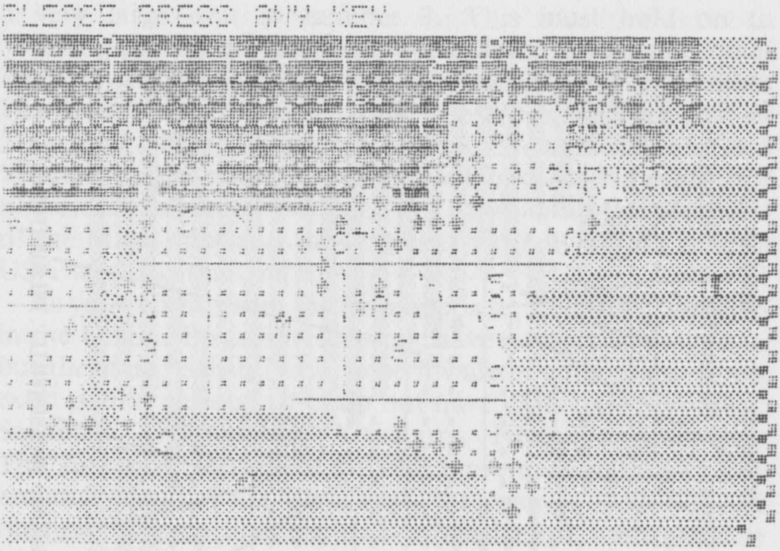
```
[illegible]
AND IS BASED ON WASHINGTON
[illegible]
AND IS BASED ON PHILADELPHIA
[illegible]
AND IS BASED ON WASHINGTON
[illegible]
AND IS BASED ON WASHINGTON
[illegible]
AND IS BASED ON WASHINGTON
[illegible]
AND IS BASED ON PITTSBURGH
[illegible]
AND IS BASED ON CINCINNATI
[illegible]
AND IS BASED ON INDIANAPOLIS
[illegible]
AND IS BASED ON CAIRO
[illegible]
AND IS BASED ON ST. LOUIS
************

PLEASE PRESS ANY KEY
```

The Union fleets are all superior to the Confederate naval units. This should be borne in mind by the Southern player who should never risk a naval engagement if he can avoid it. One intact unit – no matter what its strength – can effect far more damage than a non-existent one. The Union player has a very large unit in number 3. This must hold on to Washington. Later, when the Confederate strategy becomes known, you can start an advance on Richmond. Unit number 8 is a useful force which should try to remove Memphis or Jackson if it can. Unit 9 is a representative unit of all the Mid Western and Western forces and is based on St Louis – not historically accurate, but good for opening up the area west of the Mississippi and showing that virtually all the western USA was 'for the Union'.

As you can see from the map opposite, Kentucky starts off in the Union. Louisville does not have a unit based upon it, but the state itself is liable to be invaded by the South to get extra points. Several cities do not have units based on them: Savannah, Wilmington, Vicksburg, Nashville, Knoxville. The 'diamond' squares of difficult movement mark the rivers and marshland of the Mississippi, the swamps of Florida and the main Appalachian chain. The Mississippi is navigable by both navies up to Memphis.

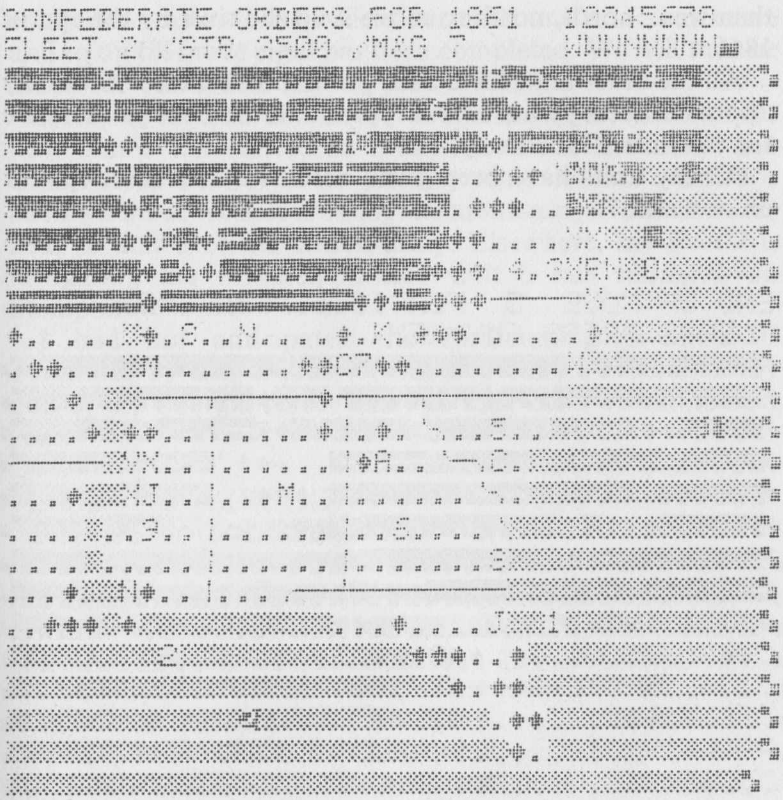
There are two areas of fortifications (marked by 'X'). The area around Richmond and Washington is well defended by both sides, and there are two squares around Vicksburg and Jackson.


MEMPHIS
NASHVILLE
LOUISVILLE
KNOXVILLE
RICHMOND
NORFOLK
ST. LOUIS
CAIRO
INDIANAPOLIS
CINCINNATI
PITTSBURG
WASHINGTON
PHILADELPHIA
VICKSBURG
JACKSON
CHATTANOOGA
COLUMBIA
SAVANNAH
JACKSONVILLE
WILMINGTON
NEW ORLEANS
MONTGOMERY
ATLANTA



```
PLEASE PRESS ANY KEY
```

Here is the American Civil War game map printed out character by character so you can better see the overall effect as the map appears on the screen. This is the official starting scenario as contained in the data given in the program printout. You can of course change the data lines as required and alter the starting positions of any of the units. The 'jungle' of barbed wire and troop units around Richmond and Washington is a little confusing till you get used to it all. I shall now play a sample game against a mythical opponent and try to give victory to the South, thus reversing the course of history!



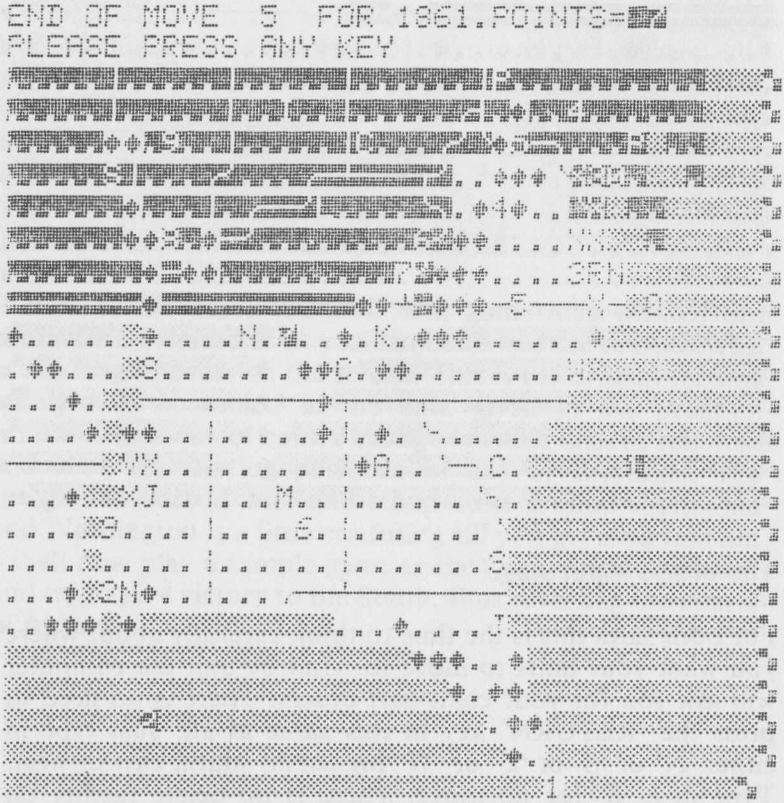
```
CONFEDERATE ORDERS FOR 1861  12345678
FLEET 2 /STR 2500 /M&G 7     WWWNNWNN
```

The orders input stage

For both sides this is the time to think carefully about where you want your units to move to. Unit by unit the computer will ask you for your eight-part orders. There is no need to press the 'RETURN' key in this game at all. Just type in either 'N' or 'S' or 'E' or 'W' for north, south, east or west. Type in a 'Ø' for no move. There is no delete facility on purpose! Just as in reality, an order once given cannot be cancelled. It must be countermanded by a later order. Here I have ordered the Confederate fleet 2, at present near the mouth of the Mississippi, to move west for three moves which will bring it due south of the river's estuary. Then it will move north for two moves to bring it opposite New Orleans and then west, north, north to move it up the river by the end of 1861.

All the other units have been given their orders without my opponent seeing what I have typed, and the Union orders are fed in while I look away.

All my units have been given defensive orders except for units 4 and 7.

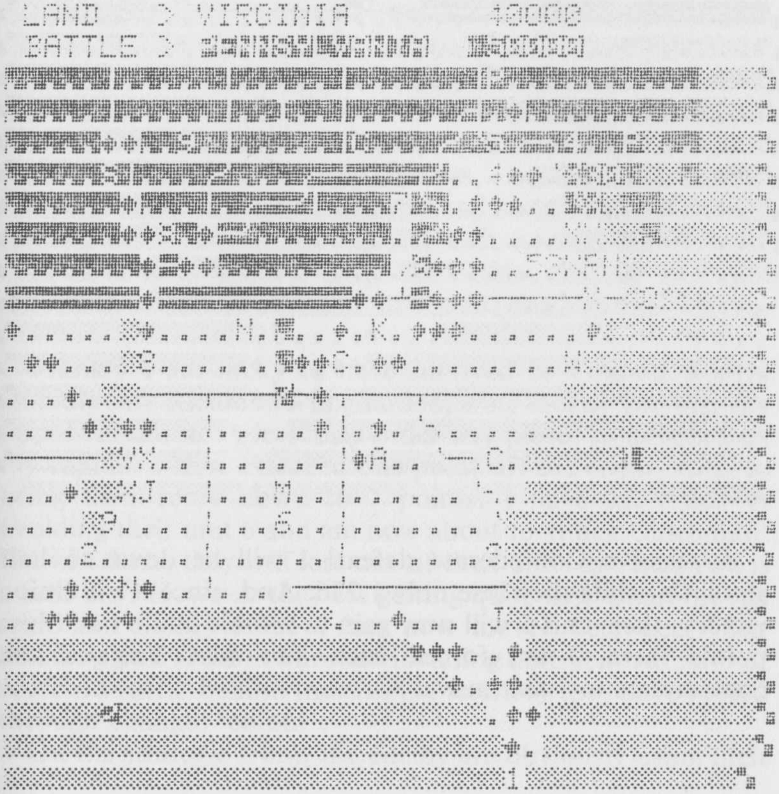


```
END OF MOVE  5  FOR 1861.POINTS=
PLEASE PRESS ANY KEY
```

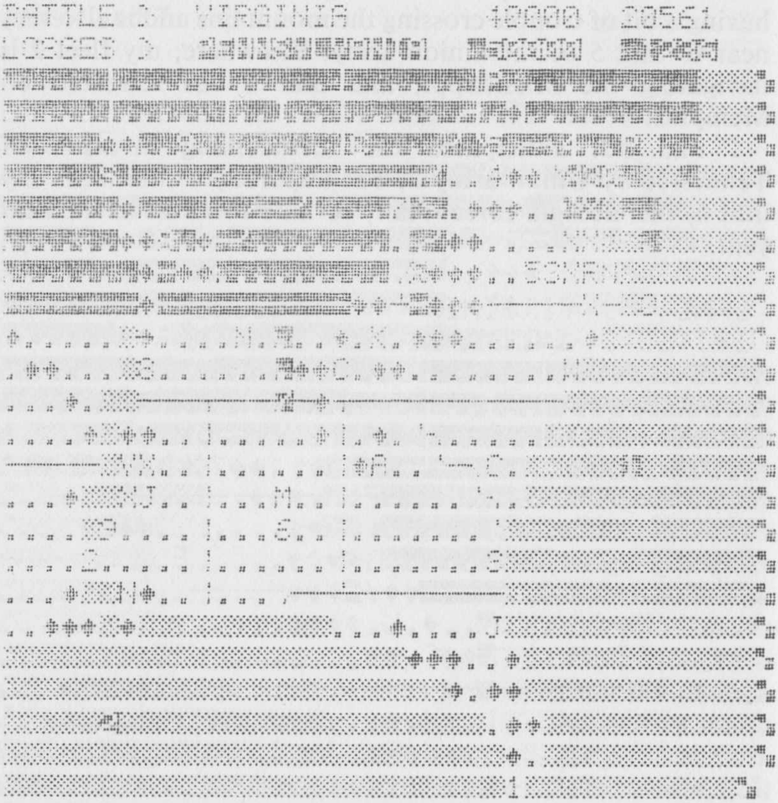
And now, with both players watching the screen, the results of our moves are displayed to the screen. The computer moves all the units their first move and calculates any combats that may happen. Then it will say ‘END OF MOVE 1’ and show the current Union points score. Next the computer reads all the orders for each unit's second move and so on till move eight has been completed. We will then be asked for our orders for the year 1862.

Here, at the end of move 5 in the first year, you can see how unit 7 has started to invade southern Kentucky, but Union force 6 is very near me. My other offensive unit 4 is having a bit of trouble crossing the mountains and is also very near to unit 5 of the Union army. Elsewhere, my fleet 2 is navigating the Mississippi, and unit 8 has retreated on Memphis.

I had not anticipated the forthcoming invasion of Tennessee by Union army 7, but hopefully I shall have my unit 6, the Georgia force, ready to take them on in the next year.

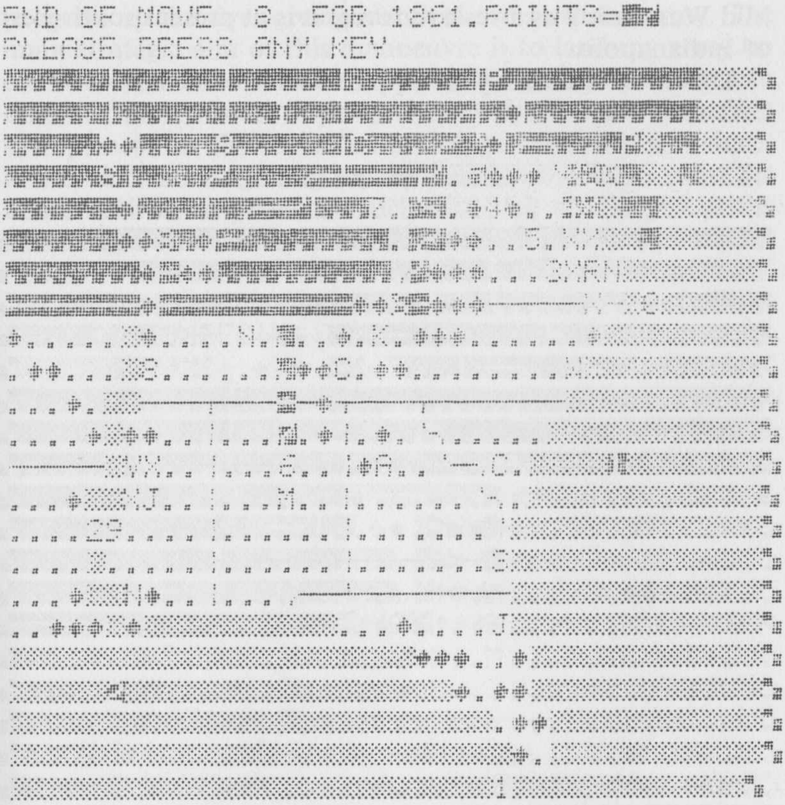


Both our units 7 are on marauding missions into enemy territory to gain points. This is now move 8 and my army unit 4 has been attacked by their army unit 5. The result could go either way.



```
BATTLE >  VIRGINIA           10000  20561
LOSSES >
```

A massive Confederate defeat! I will be down to half strength, while they lose only 1,236. And, since it's a Union victory, their unit 5 will now gain in morale while I will lose points there. I am forced back into west Virginia and contemplate my next move.



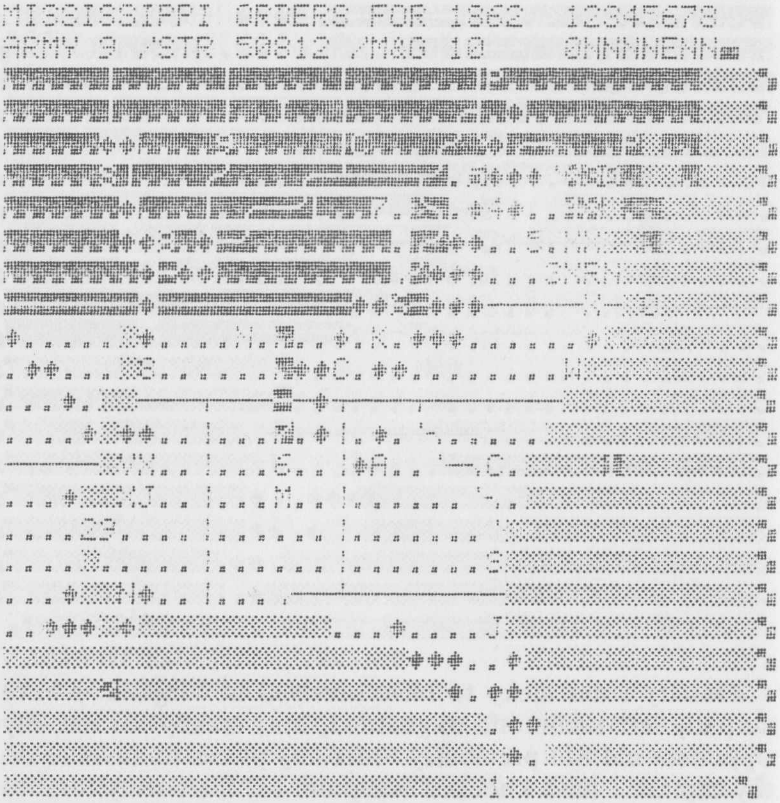
```
END OF MOVE 8 FOR 1861.POINTS=[illegible]
PLEASE PRESS ANY KEY
```

Frankly I am lucky to have survived in Virginia. I have stupidly left Richmond unguarded, but, luckily for me, my opponent did not previously order any pieces to advance on my capital. I have knocked one point off the enemy total to bring their score down to 7 points. I have succeeded in avoiding their unit 6 and am now about to attack Cincinnati. If I win there, they will lose one of their units as Cincinnati is a base city. However they are getting quite near Chattanooga with unit 6. My force 6 has now moved very near their invading unit 7. Notice how all invading units leave a 'path of scorched earth' behind them as the territory they have passed through changes 'colour'.

On the strategic front, the enemy are obviously using their

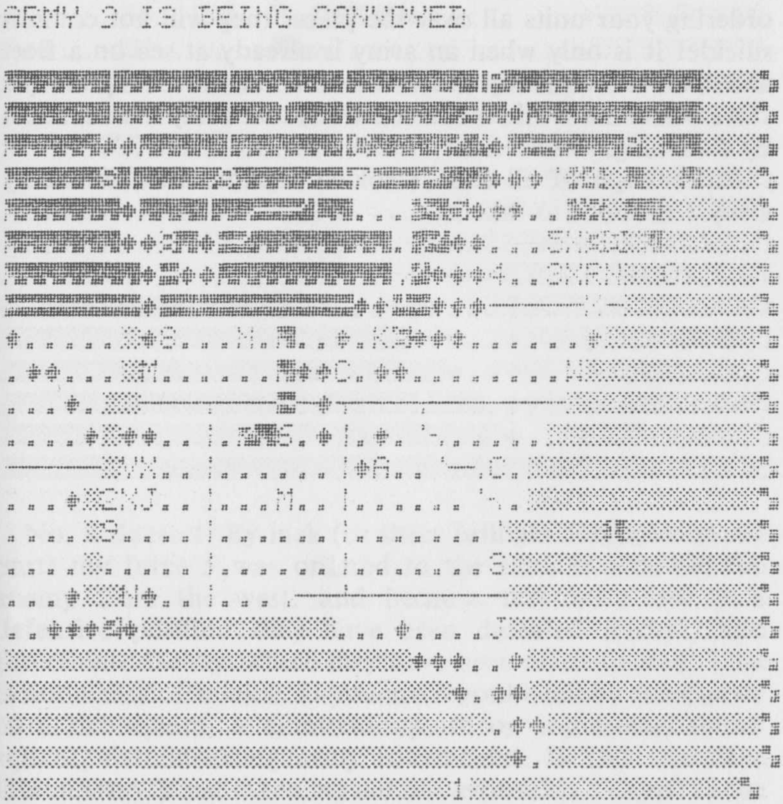
Mid West unit 9 as a reserve force: it is at present south-west of Indianapolis.

And so to the next year and a new lot of orders.



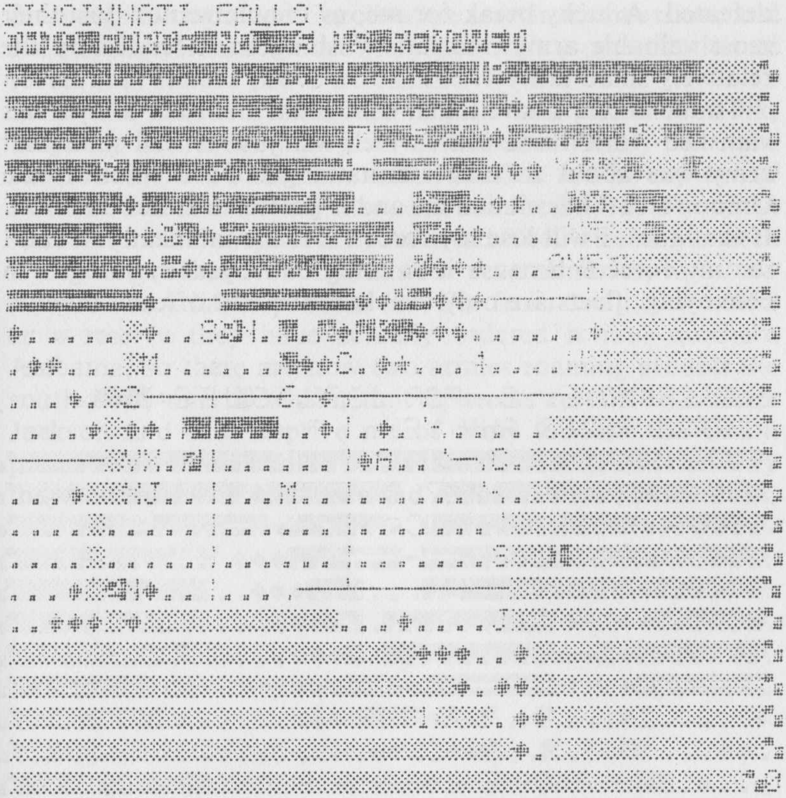
```
MISSISSIPPI ORDERS FOR 1862  12345678
ARMY 9 /STR 50812 /M&G 10    0NNNNENN
```

Here I have ordered my Mississippi army 9 to be convoyed up the river by my fleet 2. On the first move, it will stand still while my fleet is ordered one square to the north. On the second move, since fleets always move first, the fleet will have moved one square to the east, and so I can safely order my second army move due north and on to the fleet. If there wasn't a fleet to take me, the computer would display the awful words 'ARMY NO. 9 DROWNS!'. So in all my succeeding moves this year I have been careful to let the fleet progress up the river giving identical orders to the army. The main strategic aim of this manoeuvre is to land my army on the west bank of the Mississippi above Memphis and try to take St Louis. I must hope the enemy don't order their fleet 2, at present off the south coast, to attack New Orleans since, if they succeed in getting in, my fleet 2 will vanish from the board with subsequent horrific results for my army 9 if it is still being convoyed up the river – a chance I have to take.


```
ARMY 9 IS BEING CONVOYED
```

And so, two moves in to 1862, the screen displays my convoying information. The Union fleet 2 is obviously going to do some damage to the territory around the Mississippi delta. I hope they don't get into New Orleans. Elsewhere, I am attacking Cincinnati, but have not yet got in. A random element in the computer gives only a fifty-fifty chance of enemy occupation of towns or of crossing 'diamond' squares, and so I have ordered my army 7 "NNNNNNNW" in the hope that sooner or later it will get in and then move one square to the west in the final move. No army or fleet will ever move off the map or from one side to the other going the 'long way round' (i.e. all round the world, or rather behind the map!). Similarly, no army will ever move into the sea unless there is a fleet to take it. So you are quite safe in ordering your units all over the place: they will not commit suicide! It is only when an army is already at sea on a fleet and then subsequently moves on to a vacant sea square (or stays where it is while the fleet moves) that army units are lost by drowning.

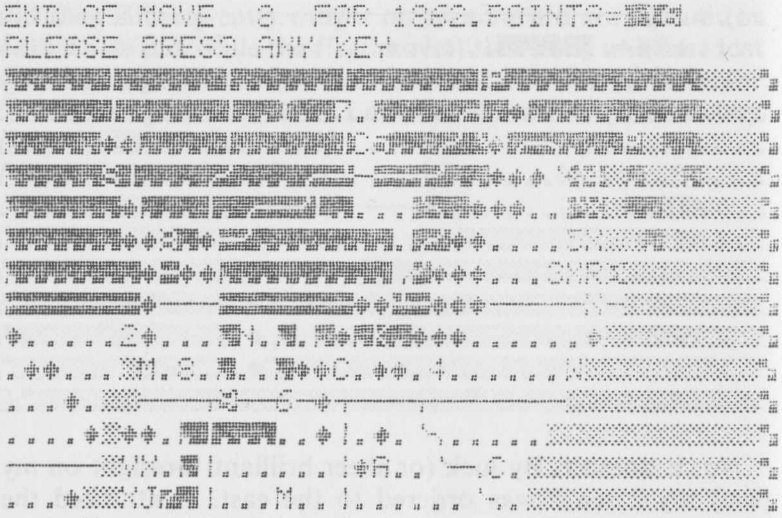
But enough of all that. Look at Richmond. The enemy army 3 is about to take it!



CINCINNATI FALLS!

No, it doesn't. By luck (or sheer brilliant foresight on my part) my force 5 was ordered to the east. It attacked the enemy from the west, and because they were not in a defensive position they have been defeated (lucky!) and forced into the sea where they have been exterminated. That is not a case of suicide. If you are forced back by combat on to a sea square, a diamond square or any enemy-colour square, the retreating army is removed. In this case, the Union army 3 had taken my defensive position (X) just to the north of Richmond, but it was not consolidated (i.e. it had not changed to their colour). The land you occupy only changes to your territory after you have passed through it. So they didn't have the advantage of being in a defensive city or fortification, otherwise I would have most certainly been defeated. A lucky break for me, as they have now lost their most valuable army and left Washington defended by the relatively small army 4.

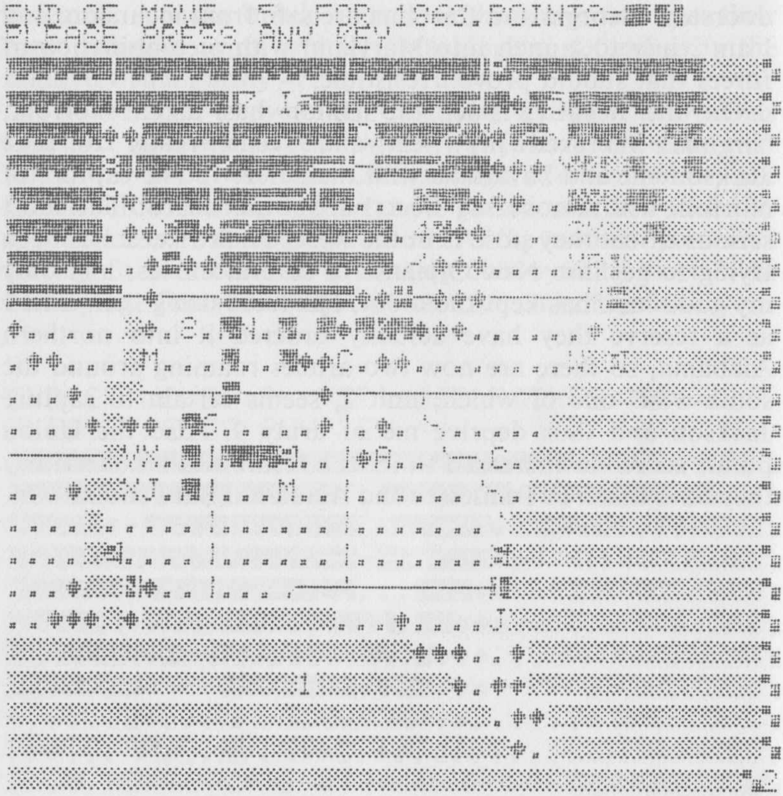
To the north, I have taken Cincinnati and their army 6 has vanished from the screen – which was just as well since that army was about to take Chattanooga. To the south, the Union force 7 has eluded me and is poised to attack Jackson. If that goes, I will lose my force 9. At the moment you can't see my force 9 because it is being convoyed by fleet 2. In convoying, fleets are only visible at the end of each move.



```
END OF MOVE 8 FOR 1862.POINTS=[illegible]
PLEASE PRESS ANY KEY
```

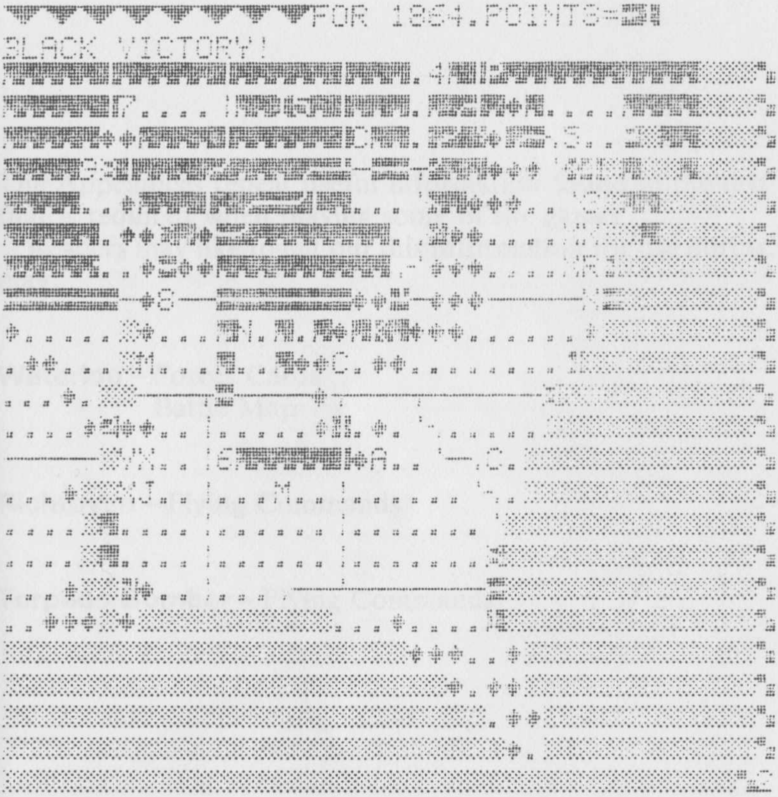
So at the end of 1862 my position has improved dramatically. My army 7 has the whole of Ohio on its doorstep. Georgia and Carolina are safe from incursion, and I am ready to launch into Maryland with a combination of forces that should prove irresistible.

On the negative side, the Union has taken Norfolk, Virginia, removed my fleet and seems ready to take Jacksonville and Savannah with their fleet 1. The capture of Norfolk will remove my fleet 1 from the board. The most serious threat they pose is in the west. Their fleet 2 has been trying to get into New Orleans for several moves, and only my good luck has kept them out. Far from using their unit 9 as a reserve they have actually ordered it into northern Alabama, so there are now two armies roaming around the south-west, one of which, unit 7, seems certain to capture Jackson and thus deprive me of army 9. Also the Union points score has increased to 16 as a result of all the territory they have taken in Tennessee and Alabama. But I should win.



```
END OF MOVE 5 FOR 1863.POINTS=[illegible]
PLEASE PRESS ANY KEY
```

Now, half way through the following year and a new lot of moves, I have removed the threat to Jackson by taking Indianapolis and removing the enemy force 7. They are chasing me through Indiana with their force 5, but I am happy to keep running and gobble up more territory. Their army 9 is now moving on Atlanta in a vain bid to distract me from my more important objectives. New Orleans has now fallen, and my fleet 2 has vanished from the scene, but it did its duty by ferrying army 9 to the western Mississippi, and this force is now laying siege to St Louis, occupied at present by the Union army 8. To the east, my army 5 had invaded Pennsylvania and the enemy have no force to stop me. It is only a matter of time now. The reason why they still have a relatively large points score is because their fleets have been doing noble work occupying my coastal squares one at a time. But since fleets must always go to sea after being on land for one move, it is a slow business. Nothing can stop me now.



```
FOR 1864.POINTS=
BLACK VICTORY!
```

There we are: victory at last. The Union has taken Jacksonville in Florida and occupied several coastal squares, but my advances into Maryland and Ohio have tipped the points score overwhelmingly in my favour.

Next game? OK.

By the way, in case you're confused by the announcement 'BLACK VICTORY', bear in mind that on the screen I am playing 'Black' and my opponent is playing 'White'. It is the printer that transfers white to black and vice-versa.

doing [illegible] my coastal squares one at a time. But since fleets must always [illegible] land for me [illegible] now.

[illegible]

There we are. Victory? [illegible] Jacksonville in Florida and [illegible] coastal squares, but my advances into Maryland and [illegible] have [illegible] points score [illegible] overwhelmingly in my favour.

Next game? OK.

[illegible]

Appendices

The Appendices repeat useful information found in the text that is required when playing some of the games.

Readers may like to cut out this information for use during play:

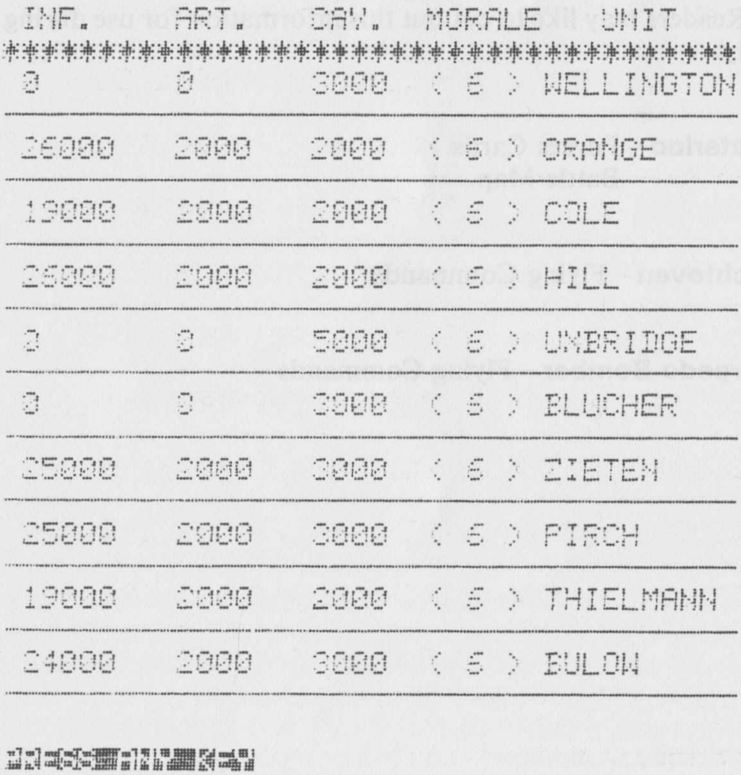
Waterloo – Forces Cards
Battle Map

Richtoven – Flying Commands

Torpedo Bomber – Flying Commands

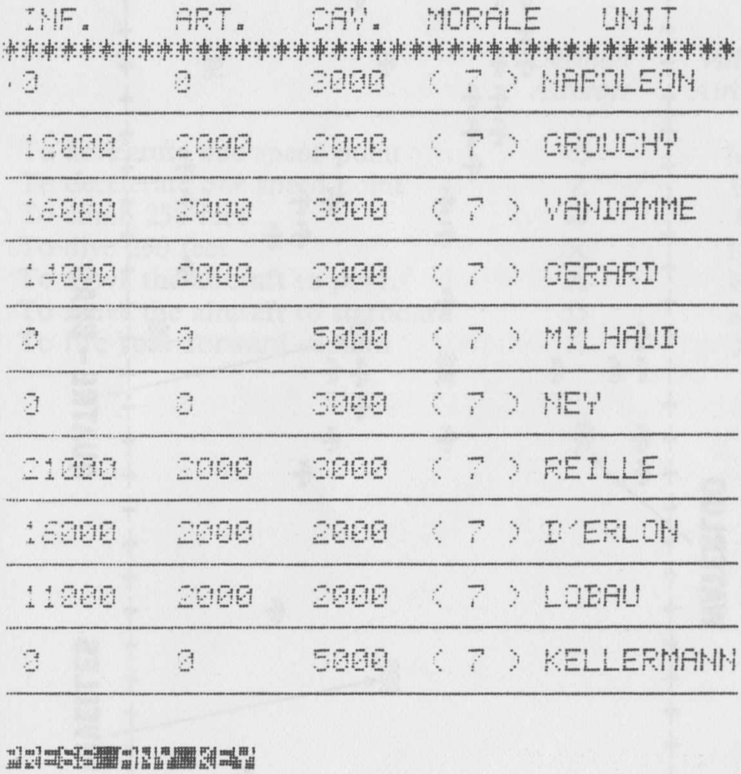
Waterloo

Allied Forces



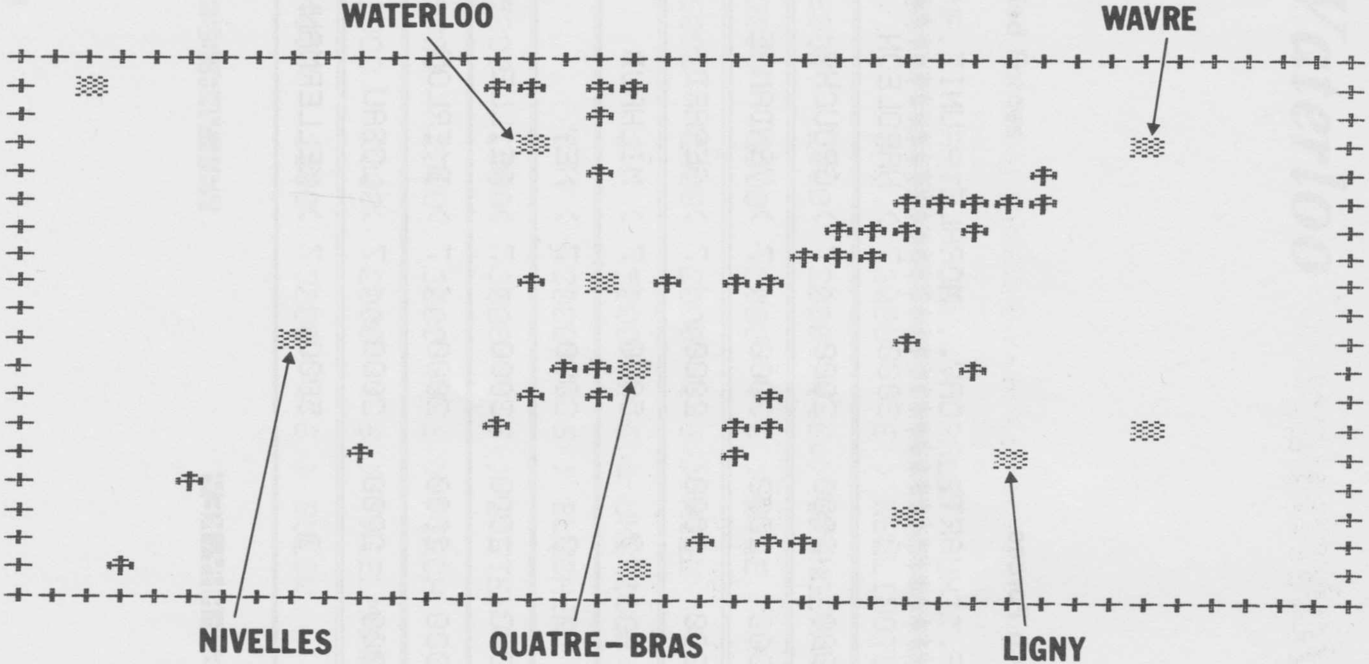
```
INF.   ART.   CAV.  MORALE  UNIT
*************************************
 0      0      3000  ( 6 ) WELLINGTON
-------------------------------------
 26000  2000   2000  ( 6 ) ORANGE
-------------------------------------
 19000  2000   2000  ( 6 ) COLE
-------------------------------------
 26000  2000   2000( 6 ) HILL
-------------------------------------
 0      0      5000  ( 6 ) UXBRIDGE
-------------------------------------
 0      0      3000  ( 6 ) BLUCHER
-------------------------------------
 25000  2000   3000  ( 6 ) ZIETEN
-------------------------------------
 25000  2000   3000  ( 6 ) PIRCH
-------------------------------------
 19000  2000   2000  ( 6 ) THIELMANN
-------------------------------------
 24000  2000   3000  ( 6 ) BULOW
-------------------------------------
```

French Forces



```
 INF.    ART.    CAV.  MORALE   UNIT
**************************************
.0       0       3000  ( 7 ) NAPOLEON
______________________________________
 19000   2000    2000  ( 7 ) GROUCHY
______________________________________
 16000   2000    3000  ( 7 ) VANDAMME
______________________________________
 14000   2000    2000  ( 7 ) GERARD
______________________________________
 0       0       5000  ( 7 ) MILHAUD
______________________________________
 0       0       3000  ( 7 ) NEY
______________________________________
 21000   2000    3000  ( 7 ) REILLE
______________________________________
 16000   2000    2000  ( 7 ) D´ERLON
______________________________________
 11000   2000    2000  ( 7 ) LOBAU
______________________________________
 0       0       5000  ( 7 ) KELLERMANN
______________________________________
```

MAIN TOWNS ON THE MAP


WATERLOO
WAVRE
NIVELLES
QUATRE – BRAS
LIGNY

Richtoven

The commands for flying are as follows:

	German Aircraft	*Allied Aircraft*
To accelerate one speed point	C	M
To decelerate one speed point	Z	B
To climb 250 feet	W	I
To dive 250 feet	X	N
To move the aircraft to port	A	H
To move the aircraft to starboard	D	K
To fire your forward cannon	S	J

Torpedo Bomber

The controls are as follows:

S	Throttle down (20 Km/hr)
A	Throttle up (20 Km/hr)
1	Hard to port (15 degrees)
9	Hard to starboard (15 degrees)
2	1 degree to port
8	1 degree to starboard

The space key releases your torpedo which runs independently in the direction dropped at a constant speed of 75 Kmh.
Measurements in Kilometres, Kmh, degrees.
Everything moves in ‘real time’.
Ship’s aspect changes as in real life.

NOTES

The Commodore 64 is a machine for enthusiasts who take their micros seriously. Readers will find this stunning collection of programs both substantial and challenging, with detailed documentation and historical notes. These are games which exploit the machine's graphics capabilities to the limits, while at the same time offering readers intricate strategies and exciting simulations to fire the imagination and tax the wits. The games include:

DREADNOUGHT

Battleships and cruisers explode in full colour over the 64 screen as columns of naval fleets struggle for dominance in this classic of 20th-century warfare.

WATERLOO

The most famous Napoleonic engagement of them all, now a game for two players. A meticulously realistic simulation which turns the 64 screen into a map of Southern Belgium and the players into generals with the lives of thousands in their hands.

TORPEDO BOMBER

You are the pilot of a lone aircraft scouring the seas for enemy shipping. The 64 graphics move you in 'real time' as you manoeuvre for the best position to up your tally.

Plus ancient warfare in Caractacus, strategic warfare in 19th-century Europe, and the American Civil War.

Humphrey Walwyn brings his considerable artistic talents, historical knowledge and programming skills together in this unique collection of **MICROWARS ON THE COMMODORE 64.**

ISBN 0 7126 0229 1
CENTURY PUBLISHING CO. LTD

£5.95